A 57.46/3: 4/989

U. S. DOCUMENTS COLLECTION
GOVT. DEPOSITORY LIBRARY

APR 24 1989

42
MONTANA STATE LIBRARY

United States
Department of
Agriculture

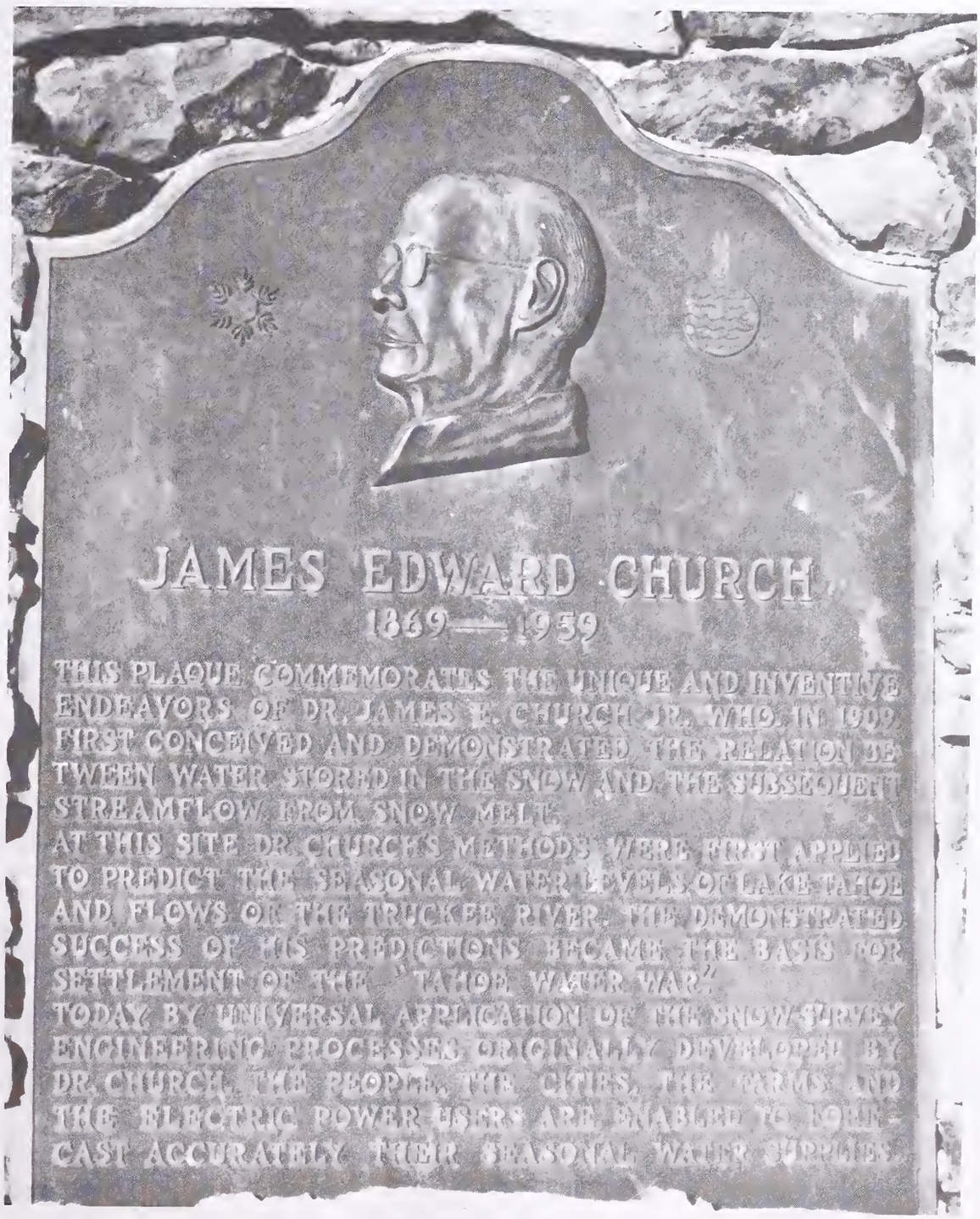
Soil
Conservation
Service

Bozeman,
Montana

Montana Water Supply Outlook

April 1, 1989

PLEASE RETURN


JAMES EDWARD CHURCH
1869—1959
THIS PLAQUE COMMEMORATES THE UNIQUE AND INVENTIVE
ENDEAVORS OF DR. JAMES E. CHURCH JR. WHO IN 1909
FIRST CONCEIVED AND DEMONSTRATED THE RELATION BE-
TWEEN WATER STORED IN THE SNOW AND THE SUBSEQUENT
STREAMFLOW FROM SNOW MELT.
AT THIS SITE DR. CHURCH'S METHODS WERE FIRST APPLIED
TO PREDICT THE SEASONAL WATER LEVELS OF LAKE TAHOE
AND FLOWS OF THE TRUCKEE RIVER. THE DEMONSTRATED
SUCCESS OF HIS PREDICTIONS BECAME THE BASIS FOR
SETTLEMENT OF THE "TAHOE WATER WAR."
TODAY BY UNIVERSAL APPLICATION OF THE SNOW SURVEY
ENGINEERING PROCESSES ORIGINALLY DEVELOPED BY
DR. CHURCH, THE PEOPLE, THE CITIES, THE FARMS AND
THE ELECTRIC POWER USERS ARE ENABLED TO FORE-
CAST ACCURATELY THEIR SEASONAL WATER SUPPLIES.

Montana State Library
3 0864 1004 8765 4

Foreword

How Forecasts Are Made

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts. Streamflow forecasts are coordinated by Soil Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply outlook conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data are obtained by using a combination of manual and automated measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via radio telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

An error is associated with each forecast, and this error decreases as the season progresses and more data becomes available. To express the range of error that can be expected, "most probable" forecasts are issued along with a range representing a "reasonable minimum" and a "reasonable maximum". Actual streamflow can be expected to fall within this range in eight out of ten years. Additionally two specific scenarios are provided based on the assumption that subsequent precipitation will be "wet", above average, or "dry", below average.

For More Information

Copies of Monthly Water Supply Outlook Reports and other reports may be obtained from the states listed below. An annual snow survey data summary is published by the Soil Conservation Service for each of the western states. Historical snow survey data may be obtained at those same offices.

STATE	ADDRESS
Alaska	201 East 9th Ave., Suite 300, Anchorage, AK 99501-3687
Arizona	201 East Indianola Ave., Suite 200, Phoenix, AZ 85012
Colorado	2490 West 26th Ave., Building A, 3rd floor, Denver, CO 80211
Idaho	3244 Elder Street, Room 124, Boise, ID 83705
Montana	10 East Babcock, Room 443, Federal Building, Bozeman, MT 59715
Nevada	1201 Terminal Way, Room 219, Reno, NV 89502
New Mexico	517 Gold Ave. S.W., Room 3301, Albuquerque, NM 87102-3157
Oregon	1220 Southwest 3rd Ave., Room 1640, Portland, OR 97204
Utah	4402 Federal Building, 125 South State Street, Salt Lake City, UT 84147
Washington	W. 920 Riverside, Room 360, Spokane, WA 99201-1080
Wyoming	Federal Building, 100 "B" Street, Room 3124, Casper, WY 82601

In addition to state reports, a Water Supply Outlook for the Western United States is published by the Soil Conservation Service and National Weather Service monthly, January through May. Reports may be obtained from the Soil Conservation Service, West National Technical Center, 511 Northwest Broadway, Room 248, Portland, OR 97209-3489.

Water supply reports published by other agencies:

California — Snow Survey Branch, California Department of Water Resources, P.O. Box 388, Sacramento, CA 95802; British Columbia — The Ministry of Environment, Water Investigations Branch, Parliament Buildings, Victoria, British Columbia, V8V 1X5; Yukon Territory — Department of Indian and Northern Affairs, Northern Operations Branch, 200 Range Road, Whitehorse, Yukon Territory, Y1A3V1; Alberta, Environment Technical Services Division, 9820 106th St., Edmonton, Alberta T5K 2J6.

Montana
Water Supply Outlook

and

Federal - State - Private
Cooperative Snow Surveys

Issued by

Wilson Scaling
Chief
Soil Conservation Service
Washington, D.C.

Released by

Richard J. Gooby
State Conservationist
Soil Conservation Service
Bozeman, Montana

Prepared by

Phillip E. Farnes
Snow Survey Supervisor
Soil Conservation Service
10 E. Babcock
Bozeman, Montana 59715

Programs and assistance of the United States Department of Agriculture are available without regard to race, creed, color, sex, age, or national origin.

ON THE COVER:

This plaque on the outlet gate at Lake Tahoe, Nevada, commemorates the start of snow surveys in 1909.

Table of Contents

State Streamflow Map 3

State General Outlook 4

Basin Outlook and Conditions

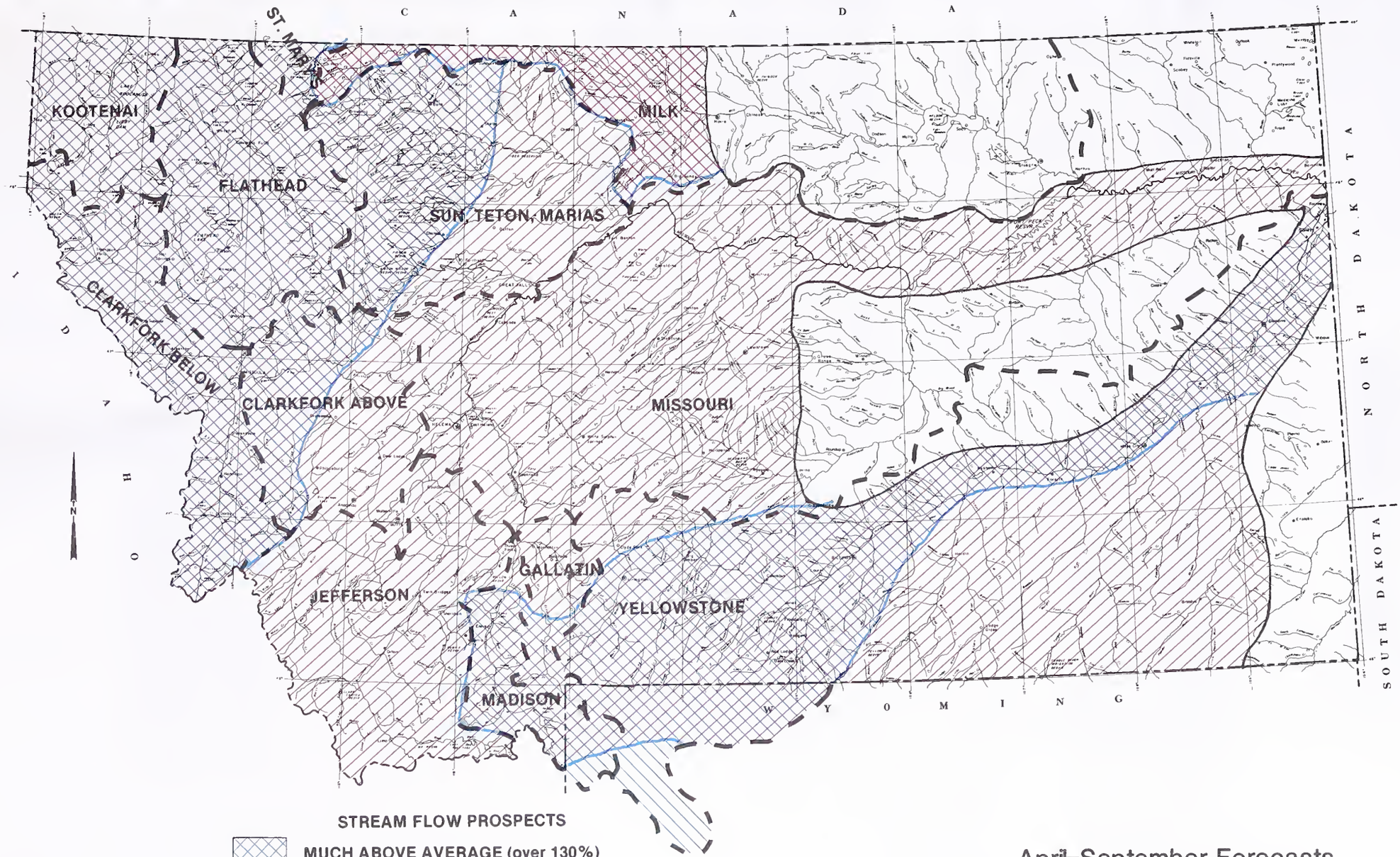
- Kootenai Basin 6
- Flathead Basin 8
- Clark Fork Basin above Missoula 10
- Clark Fork Basin below Missoula 12
- Jefferson Basin 14
- Madison Basin 16
- Gallatin Basin 18
- Missouri Basin 20
- Sun, Teton and Marias Basins 22
- St. Mary and Milk Basins 24
- Yellowstone Basin 26

Snow Data Measurements 28

Additional Information 30

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE



STREAMFLOW PROSPECTS FOR MONTANA

Spring and Summer Period

STREAM FLOW PROSPECTS

- MUCH ABOVE AVERAGE (over 130%)
- ABOVE AVERAGE (110-130%)
- NEAR AVERAGE (90-110%)
- BELOW AVERAGE (70-90%)
- MUCH BELOW AVERAGE (below 70%)
- NOT FORECAST

April–September Forecasts
April 1, 1989

0 25 50 75 100 MI

0 50 100 150 KM

SOURCE:
Information provided by SCS Snow Survey Personnel.

JUNE 1985 4-R-39296

USDA-SCS FORT WORTH, TEXAS 1985

General Outlook

Summary

All drainages received above average to well above average mountain precipitation during March. Snowpacks are generally average over most of the State with a few exceptions. The Upper Yellowstone and Madison River headwaters in Yellowstone National Park and the Clarks Fork Headwaters, east of Yellowstone National Park, have above average snowpack. Snowpack percentages increased 5 to 15 percent over the March 1 levels. Most streamflow forecasts have increased from last month. The biggest increases in flow are expected from the Flathead, Kootenai, Madison and Yellowstone Basins.

Snowpack

The snowpack is near average over most of the State. Areas near Red Lodge, the Big Snowy and Bear Paw Mountains in central Montana, the Hyalite Drainage south of Bozeman, the Highland and northern part of the Pioneer Mountains south of Butte and the lower Clark Fork River Drainage along the Idaho Border west of Superior still have below average snow. Snowpack percentages in most areas increased 5 to 15 percent statewide over March 1 levels. Low elevation snow in many areas is above average. Some low elevation melt has cleared snow from valleys and south facing foothills. However, very little melt has occurred at mid and higher elevations. Mountain snowpacks are warming internally and will be ready to melt after a few warm days.

Precipitation

March mountain precipitation was well above average statewide varying from 115 percent of average in the Gallatin Basin to 167 percent of average in the Yellowstone Basin. Nearly all of the mountain precipitation was snow.

Reservoirs

Most irrigation reservoirs still report below average storage. Some in the St. Mary, Marias, Teton, Hyalite and Yellowstone Drainages have near to above average storage. Most large multipurpose reservoirs have below average storage. Most reservoirs are expected to have near normal levels after spring runoff.

Streamflow

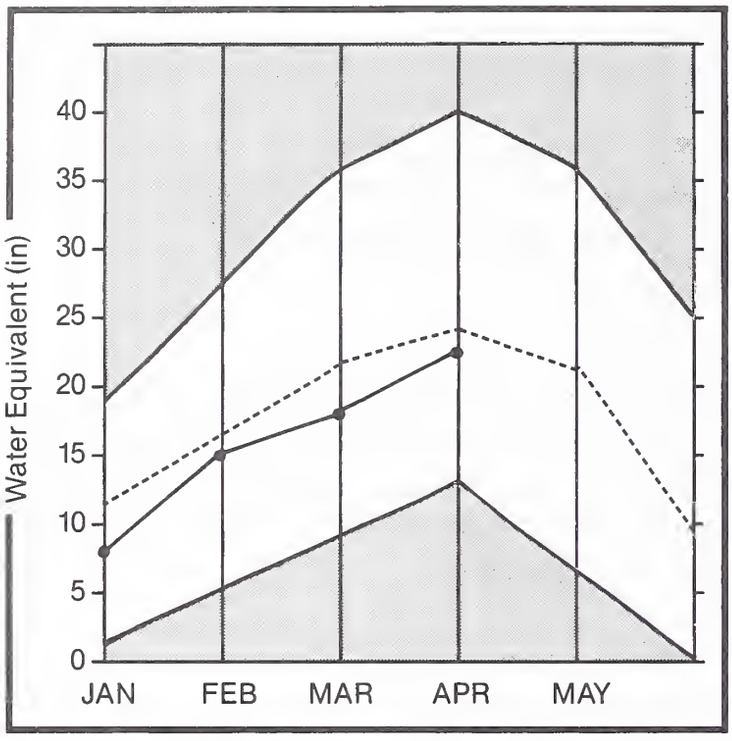
Most streamflows are forecast to be average to a little below average and have generally increased from the March 1 forecasts. The headwaters of the Madison, Clarks Fork of the Yellowstone and Yellowstone Rivers are expected to have above average flows. The Milk, Bighorn, Tongue, and Powder Rivers are forecast to have below average flows.

Soil Moisture

Soils under the snowpack are still drier than usual except in the northwestern part of the State. Some lower elevation melt has occurred and has begun to recharge the soils. Improved snowpack levels should contribute towards recharging this moisture in mountain soils to near normal levels.

Kootenai Basin

Mountain snowpack* (inches)



*Kootenai in Montana

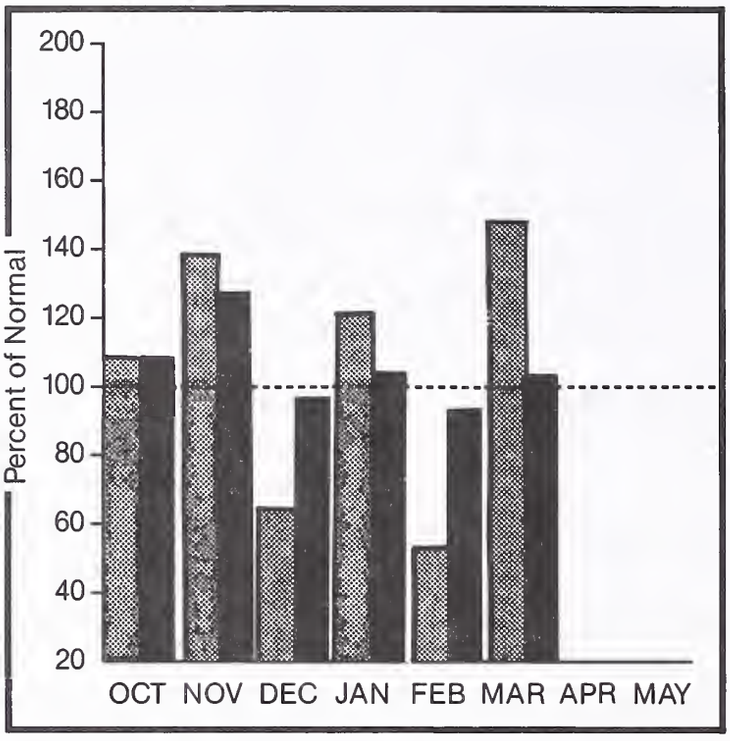
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation was 150 percent of average for March. Snowpacks have increased 14 percent of average since March 1 and are now at average levels throughout the Basin including drainages in Canada. Spring and summer streamflow forecasts have increased and are now indicating slightly below average flow.

For more information contact your local Soil Conservation Service office.

KOOTENAI RIVER BASIN in Montana

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
KOOTENAI bl Libby Dam (2)	APR-JUL	5600	95			6660	4480	5885
	APR-SEP	6570	95			7810	5260	6903
FISHER nr Libby	APR-JUL	225	94	255	200	285	167	240
	APR-SEP	240	94	270	215	300	179	256
YAAK nr Troy	APR-JUL	445	90	490	400	565	325	494
	APR-SEP	470	91	505	435	595	345	517
KOOTENAI at Leonia (2)	APR-JUL	6950	95			8270	5560	7340
	APR-SEP	7990	95			9510	6390	8441

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LAKE KOOCANUSA	5748.0	1372.0	1291.0	1786.0

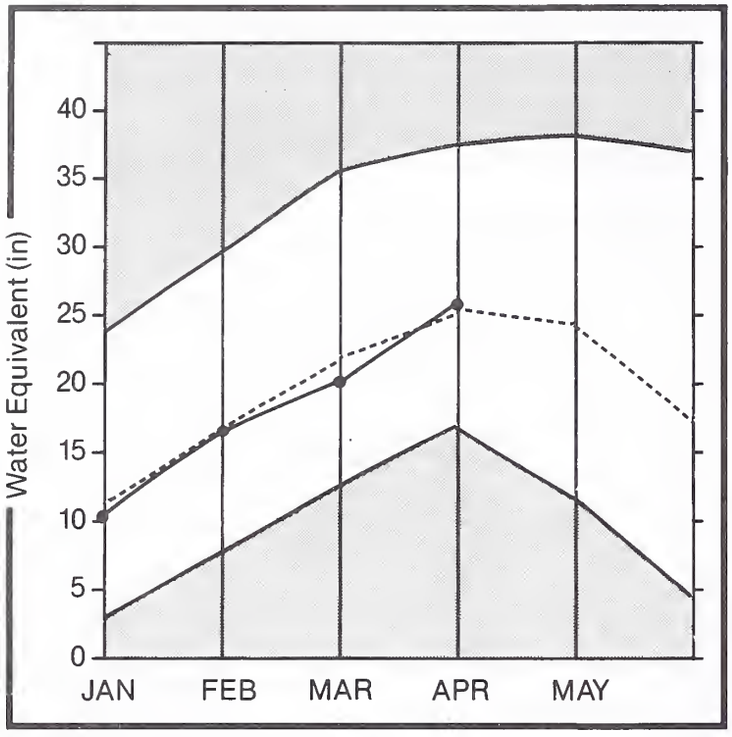
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
EAST KOOTENAI in B.C.	28	124	101
KOOTENAI in MONTANA	29	137	96
KOOTENAI ab BONNERS FERRY	57	131	98

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Flathead Basin

Mountain snowpack* (inches)



*Flathead

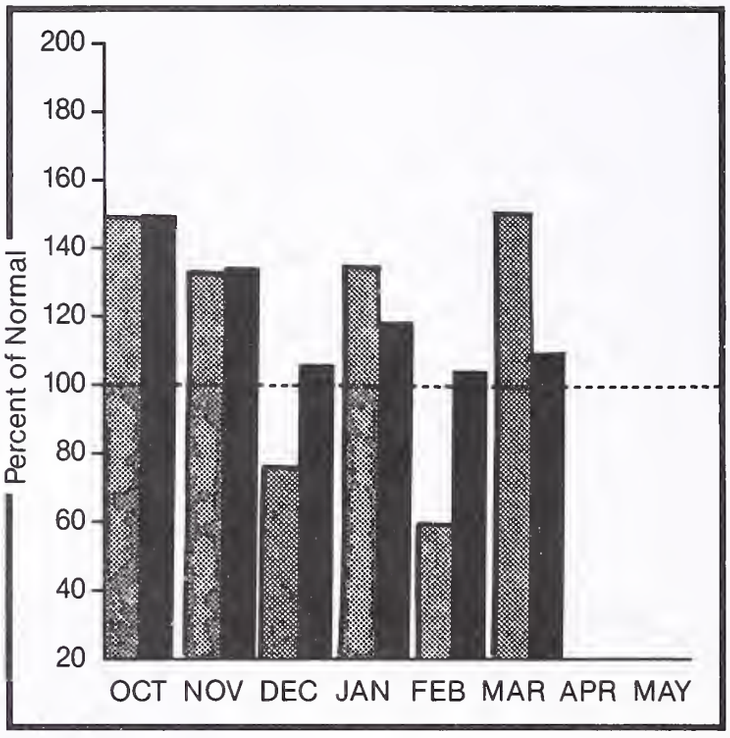
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation was 150 percent of average during March. Snowpack levels have increased about 10 percent of average since March 1 and are now near average. Low elevation snow is above average in many areas. Near average spring and summer runoff is now expected from all streams and rivers in the drainage.

For more information contact your local Soil Conservation Service office.

FLATHEAD RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
NF FLATHEAD nr Columbia Falls	APR-JUL	1610	95	1700	1520	1870	1370	1701
	APR-SEP	1780	95	1860	1700	2060	1520	1880
MF FLATHEAD nr West Glacier	APR-JUL	1610	96			1830	1390	1680
	APR-SEP	1760	96	1820	1700	2000	1520	1836
SF FLATHEAD nr Columbia Falls (1)	APR-JUL	2140	101	2250	2030	2540	1720	2110
	APR-SEP	2280	101	2370	2190	2710	1830	2248
FLATHEAD at Columbia Falls (1)	APR-JUL	5540	99	5710	5370	6550	4530	5621
	APR-SEP	6020	98	6140	5900	7120	4920	6114
SWAN nr Bigfork	APR-JUL	605	101	615	595	685	525	597
	APR-SEP	680	100	695	675	770	590	683
FLATHEAD nr Polson (2)	APR-JUL	6680	101	6880	6480	7540	5820	6586
	APR-SEP	7250	101	7320	7180	8180	6320	7150

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
CAMAS (4)	45.2	9.9	15.5	23.8
MISSION VALLEY (8)	100.0	27.8	31.5	41.3
HUNGRY HORSE	3451.0	1128.0	843.0	2098.0
FLATHEAD LAKE	1791.0	675.0	868.0	753.0

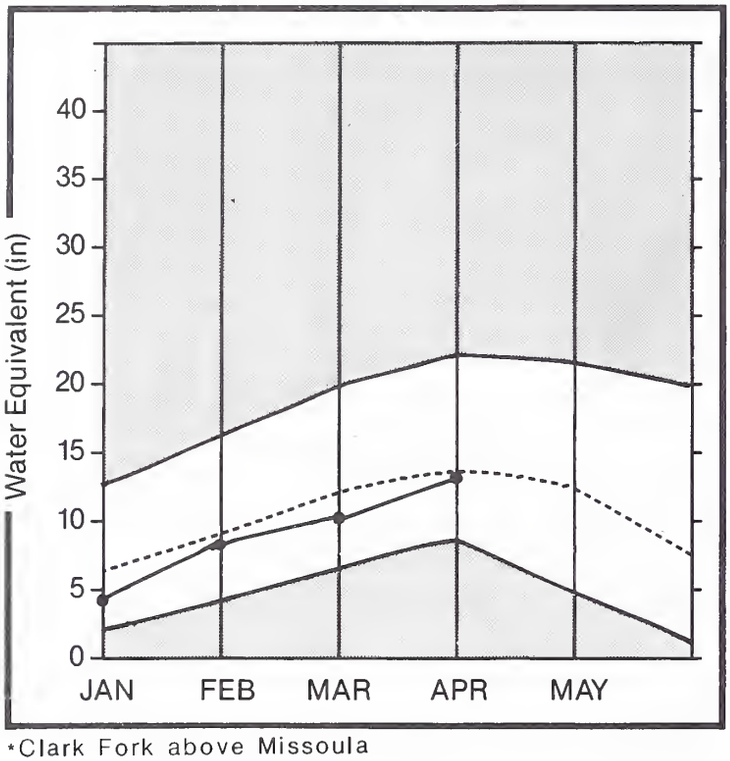
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
NORTH FORK FLATHEAD	16	131	99
MIDDLE FORK FLATHEAD	12	120	97
SOUTH FORK FLATHEAD	13	137	107
STILLWATER-WHITEFISH	9	134	96
SWAN	12	137	107
LITTLE BITTERROOT	8	176	108
FLATHEAD	50	133	103

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Clark Fork Basin above Missoula

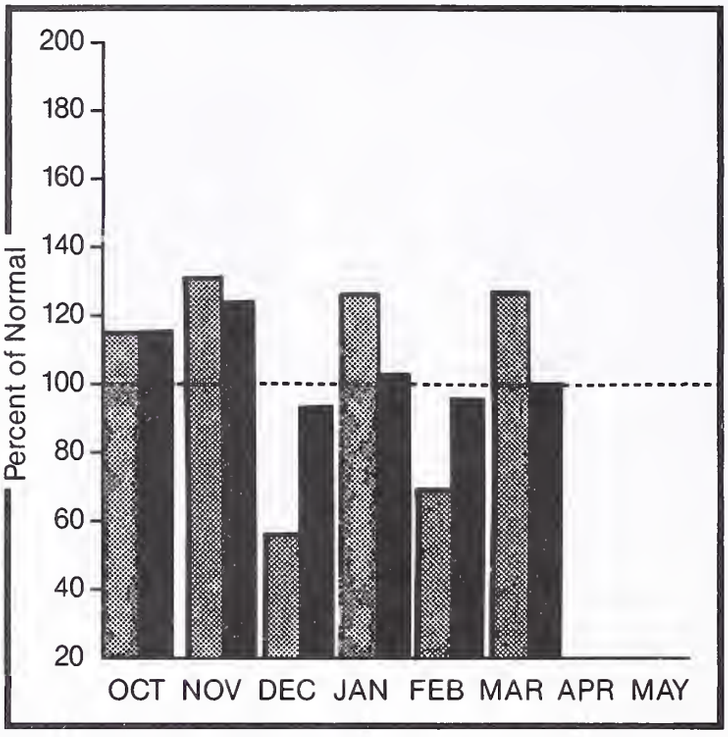
Mountain snowpack* (inches)



*Clark Fork above Missoula

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

Mountain precipitation for March was 125 percent of average. The snowpack is now near average throughout the basin and increased about 10 percent from March 1 levels. Spring and summer streamflow forecasts have increased 5 to 10 percent across the basin and are now indicating near average flows. The Blackfoot River should have slightly above average flow this spring and summer.

For more information contact your local Soil Conservation Service office.

CLARK FORK RIVER BASIN above Missoula

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MOULTON RESERVOIR inflow (2)	APR-JUN	210	89	235	186	265	153	237
	APR-JUL	230	87	260	200	295	167	263
WARM SPRINGS CK nr Anaconda (2)	APR-JUL	32	82	34	30	41	23	39
	APR-SEP	40	82	43	38	52	28	49
FLINT CK nr Southern Cross (2)	APR-JUL	12.4	84	16.0	8.8	17.4	7.4	14.8
	APR-SEP	15.0	84	19.3	10.5	21	8.9	17.8
FLINT CK bl Boulder Ck (2)	APR-JUL	52	85	65	39	73	31	61
	APR-SEP	66	85	81	51	93	39	78
LOWER WILLOW CK RES inflow (2)	APR-JUL	13.7	92	18.0	9.4	18.8	8.6	14.9
	APR-SEP	14.8	94	18.7	10.9	20	9.4	15.8
MF ROCK CK nr Philipsburg	APR-JUL	63	91	70	57	80	46	69
	APR-SEP	70	91	77	65	88	52	77
NEVADA CK nr Finn	APR-JUL	19.0	90	23	15.2	26	11.9	21
	APR-SEP	20	91	25	16.0	27	12.5	22
BLACKFOOT nr Bonner	APR-JUL	920	105	1000	840	1030	805	874
	APR-SEP	1020	105	1100	940	1150	895	969
CLARK FORK ab Milltown (2)	APR-JUL	660	94	745	575	870	450	703
	APR-SEP	755	93	845	665	1000	510	812
CLARK FORK ab Missoula	APR-JUL	1590	101	1750	1430	1950	1210	1577
	APR-SEP	1780	100	1920	1640	2210	1350	1781

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
GEORGETOWN LAKE	31.0	25.8	26.6	24.4
LOWER WILLOW CREEK	4.9	1.5	2.2	2.2
NEVADA CREEK	12.6	3.9	2.6	7.5

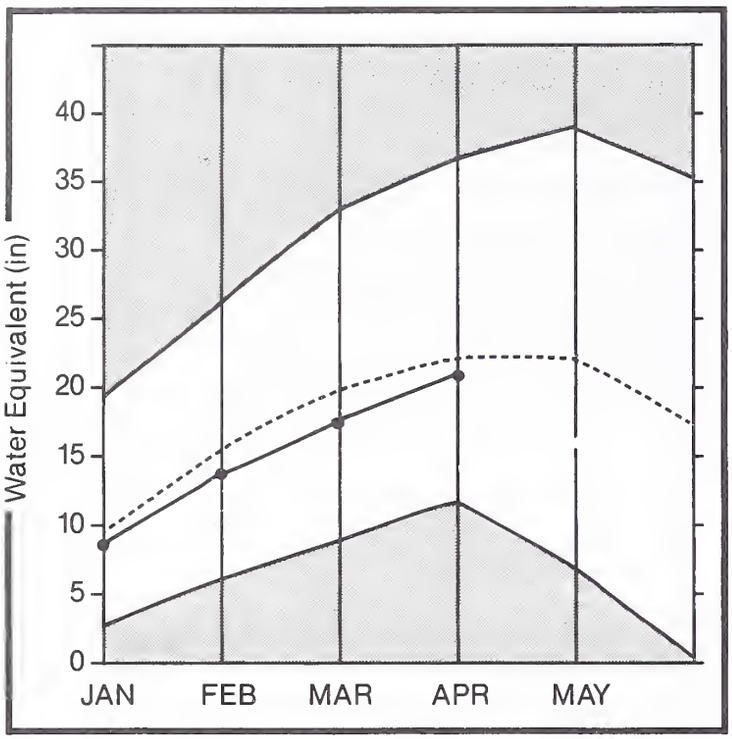
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
CLARK FORK ab BLACKFOOT	46	124	94
BLACKFOOT	22	139	106
CLARK FORK ab MISSOULA	62	128	98

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Clark Fork Basin below Missoula

Mountain snowpack* (inches)



*Bitterroot

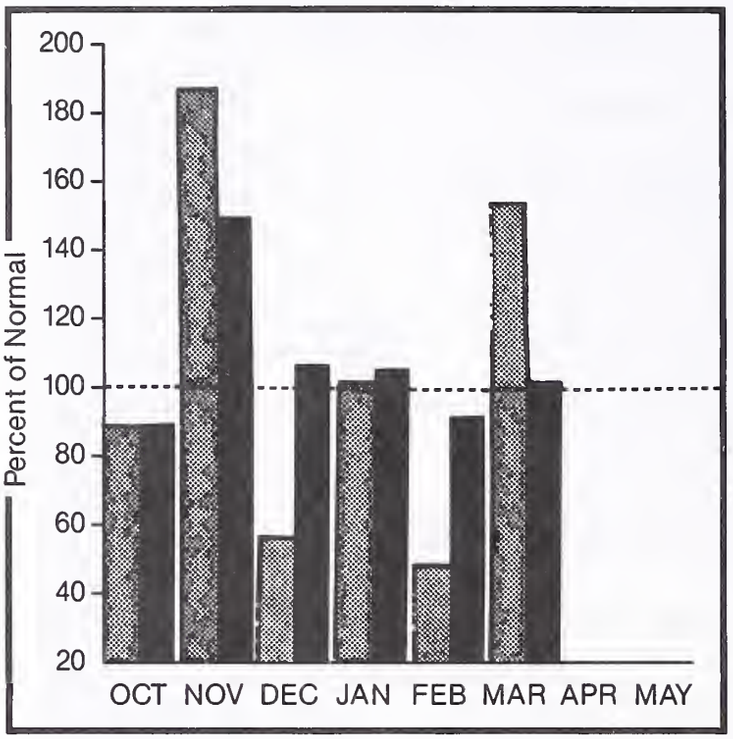
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation during March was 150 percent of average. The snowpack percentages have increased 10 percent during the month. Snowpack is now near average in the Bitterroot Drainage while along the Idaho Border below Missoula remains below average. Streamflow is forecast to be slightly below average across the basin.

For more information contact your local Soil Conservation Service office.

CLARK FORK RIVER BASIN below Missoula

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
CLARK FORK ab Missoula	APR-JUL	1590	101	1750	1430	1950	1210	1577
	APR-SEP	1780	100	1920	1640	2210	1350	1781
WF BITTERROOT nr Conner (2)	APR-JUL	138	94	163	114	173	103	147
	APR-SEP	157	93	181	133	198	116	169
BITTERROOT nr Darby	APR-JUL	505	96	580	430	630	380	524
	APR-SEP	555	97	630	480	695	415	573
ROCK CK nr Darby	APR-SEP	82	98			98	66	84
SKALKAHO CK nr Hamilton	APR-JUL	44	96	48	39	50	38	46
	APR-SEP	51	94	54	46	58	44	54
BURNT FORK nr Stevensville (2)	APR-JUL	30	94	33	28	38	22	32
	APR-SEP	36	95	39	34	45	27	38
BITTERROOT at Missoula (2)	APR-JUL	1330	97	1440	1230	1660	1000	1371
	APR-SEP	1450	97	1540	1360	1810	1090	1497
CLARK FORK bl Missoula	APR-JUL	2920	99	3190	2680	3540	2300	2948
	APR-SEP	3230	99	3460	3000	3920	2570	3276
CLARK FORK at St. Regis	APR-JUL	3780	97			4680	2810	3894
	APR-SEP	4180	97			5220	3140	4325
CLARK FORK nr Plains (2)	APR-JUL	10500	97			12700	8550	10850
	APR-SEP	11600	97			14000	9330	11930
THOMPSON nr Thompson Falls	APR-JUL	200	90	210	191	250	151	222
	APR-SEP	225	90	235	220	280	170	250
PROSPECT CK at Thompson Falls	APR-JUL	113	88	117	109	144	82	128
	APR-SEP	120	88	123	117	153	87	137
CLARK FORK at Whitehorse Rapids (2)	APR-JUL	11800	97			14200	9370	12150
	APR-SEP	13000	97			15700	10300	13370

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
PAINTED ROCKS LAKE	31.7	0.0	0.0	15.7
NOXON RAPIDS	335.0	304.3	306.3	213.6
COMO	34.9	10.9	7.3	15.5

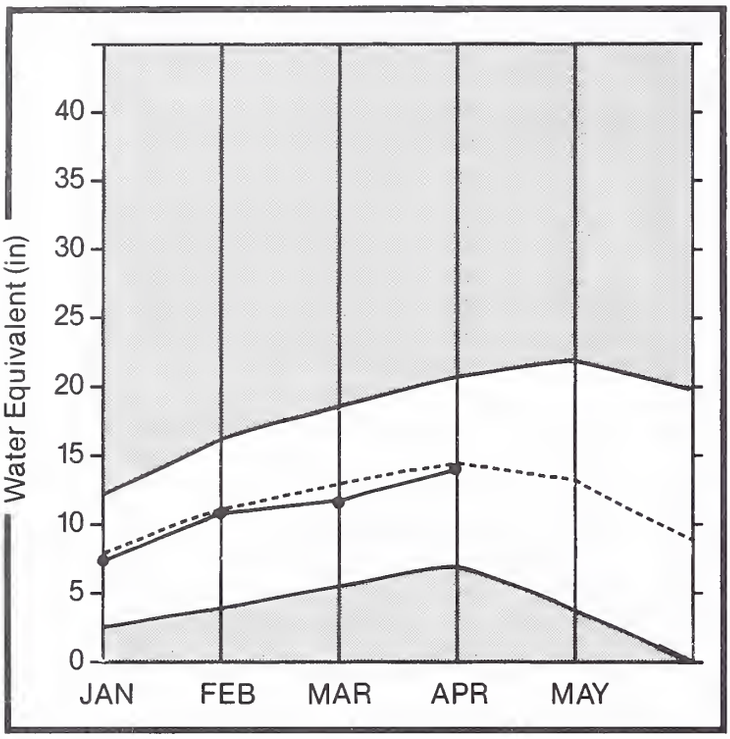
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
CLARK FORK ab MISSOULA	62	128	98
BITTERROOT	25	115	96
LWR CLARK FK bl MISSOULA	22	125	93
BITTERROOT & LWR C.F.	45	120	95
CLARK FORK TOTAL	101	124	96
FLATHEAD	49	133	103
PEND OREILLE	144	127	98

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Jefferson Basin

Mountain snowpack* (inches)



*Jefferson

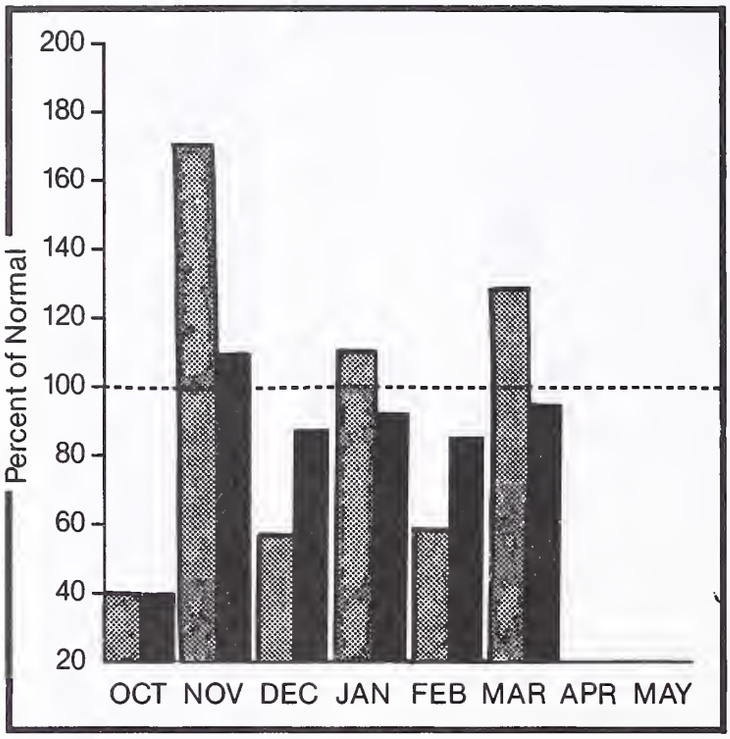
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

March mountain precipitation was well above average. The snowpack in most of the Jefferson Basin has increased and is now average. Only the Highland and northern part of the Pioneer Mountains, south of Butte, remain below average. Forecasted streamflows for spring and summer runoff increased slightly from those forecasted on March 1.

For more information contact your local Soil Conservation Service office.

JEFFERSON RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
RED ROCK RIVER near Monida 2	APR-JUL	90	86	111	69	122	59	105
	APR-SEP	97	85	128	66	131	63	114
BEAVERHEAD RIVER near Grant 2	APR-JUL	120	81	199	41	165	75	149
	APR-SEP	139	79	240	39	192	87	175
BEAVERHEAD RIVER at Barratts 2	APR-JUL	154	80	235	71	210	96	192
	APR-SEP	178	79	285	77	245	111	224
RUBY RIVER near Alder	APR-JUL	68	76	86	49	90	46	89
	APR-SEP	83	78	100	66	110	57	106
BIG HOLE RIVER near Melrose	APR-JUL	555	80	750	345	730	380	696
	APR-SEP	610	81	830	390	800	420	757
WILLOW CREEK near Harrison	APR-JUL	14.6	78	26	2.8	21	8.2	18.7
	APR-SEP	16.3	78	29	3.3	23	9.2	21
BOULDER RIVER near Boulder	APR-JUL	84	92	119	49	109	59	91
	APR-SEP	90	93	129	50	116	64	97
JEFFERSON RIVER near Three Forks	APR-JUL	795	76	1200	355	1110	480	1042
	APR-SEP	885	77	1360	425	1230	540	1156

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LIMA	84.0	13.2	15.8	39.1
CLARK CANYON	255.6	115.6	175.7	152.7
RUBY RIVER	38.8	29.6	31.9	31.0

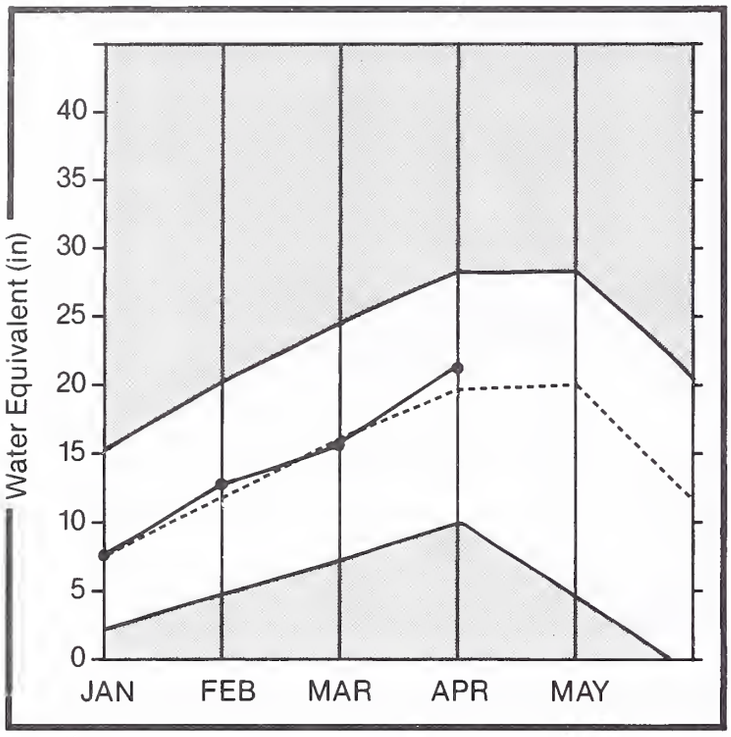
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
BEAVERHEAD	35	147	104
RUBY	14	131	94
BIGHOLE	30	123	94
BOULDER	15	122	93
JEFFERSON	75	134	99

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Madison Basin

Mountain snowpack* (inches)



*Madison

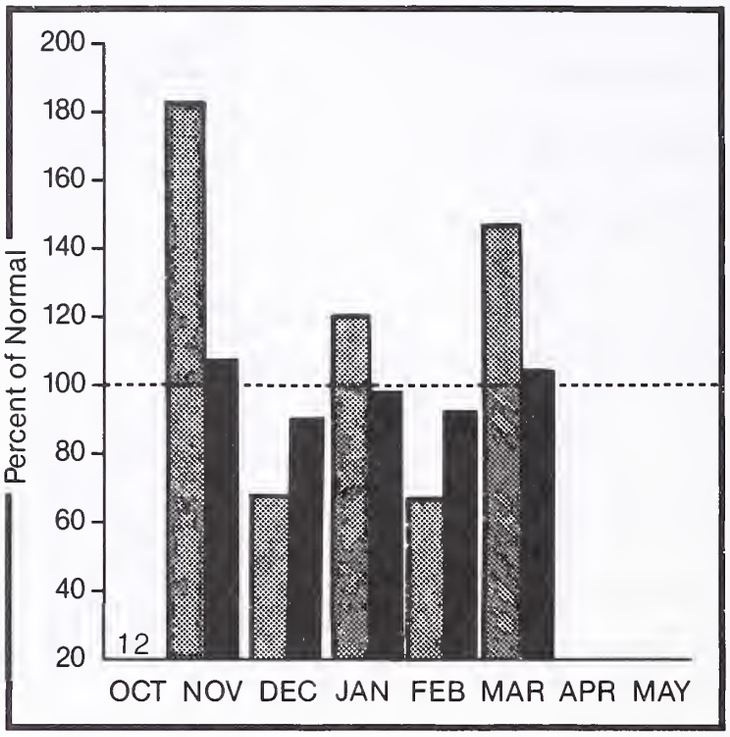
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation for March was 150 percent of average over the Basin. The snowpack in the upper basin above Hebgen Lake has now increased to above average and the lower basin to near average. The forecasts have increased about 10 percent and spring and summer runoff is now expected to be slightly above average.

For more information contact your local Soil Conservation Service office.

MADISON RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MADISON RIVER near Grayling 2	APR-JUL	450	115	510	390	505	395	390
	APR-SEP	565	113	640	485	635	495	499
MADISON RIVER near McAllister 2	APR-JUL	720	106	870	570	830	610	680
	APR-SEP	895	105	1050	740	1030	760	856

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
ENNIS LAKE	41.0	30.8	31.1	33.7
HEBGEN LAKE	377.5	264.5	279.6	241.1

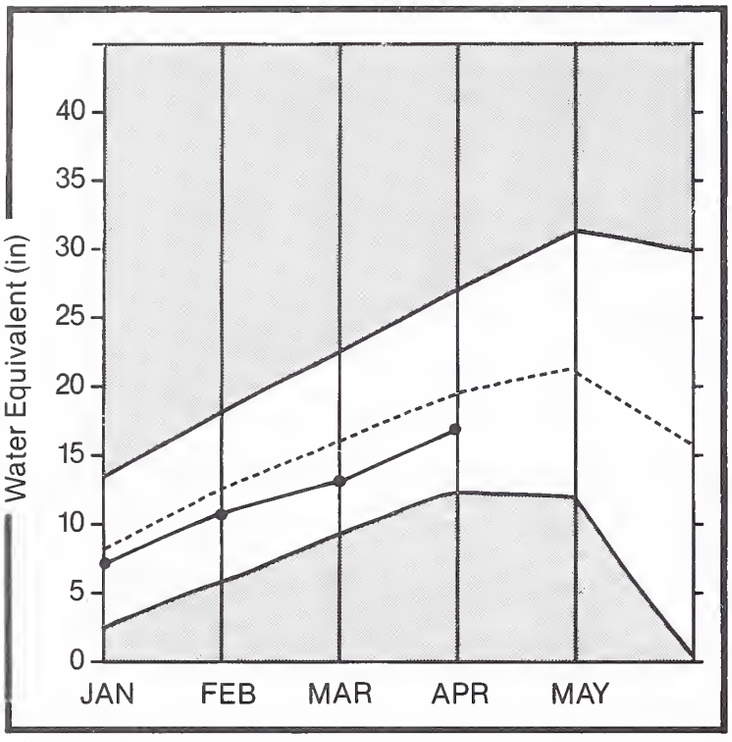
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	THIS YEAR AS % OF AVERAGE
MADISON above HEBGEN	16	162	121
LOWER MADISON	21	134	97
MADISON	37	148	109

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Gallatin Basin

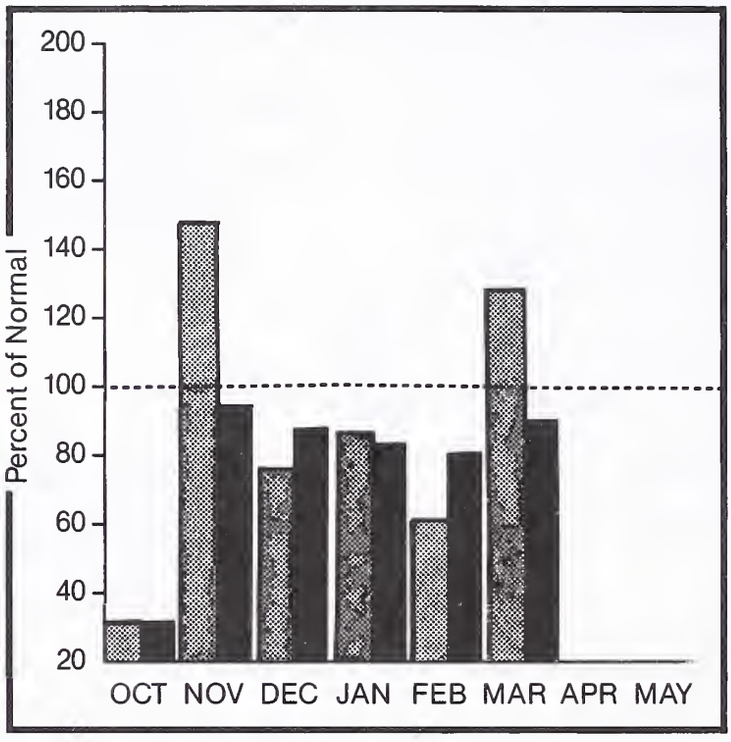
Mountain snowpack* (inches)



*Gallatin

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

Mountain precipitation during March was a little above average. The snowpack over most of the Basin has increased about 10 percent and is now a little below average. The headwaters in and near Yellowstone National Park have better snow than the rest of the drainage. Snow in the Hyalite Drainage remains below average. Streamflow forecasts increased except the Hyalite Drainage which remained relatively unchanged. Spring and summer runoff is expected to be 15 to 20 percent below average.

For more information contact your local Soil Conservation Service office.

GALLATIN RIVER BASIN

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
GALLATIN RIVER near Gateway	APR-JUL	385	84	530	240	460	310	460
	APR-SEP	455	84	635	280	540	370	540
E & W FK. HYALITE CR. nr Bozeman 2	APR-JUL	19.8	83	27	12.1	24	15.2	24
	APR-SEP	23	82	31	14.6	28	17.7	28
HYALITE CREEK near Bozeman 2	APR-JUL	30	79	44	15.6	38	22	38
	APR-SEP	35	80	51	19.6	44	26	44
GALLATIN RIVER at Logan	APR-JUL	440	83	725	230	570	310	528
	APR-SEP	510	83	825	250	665	355	616

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
MIDDLE CREEK	8.0	4.3	5.7	3.9

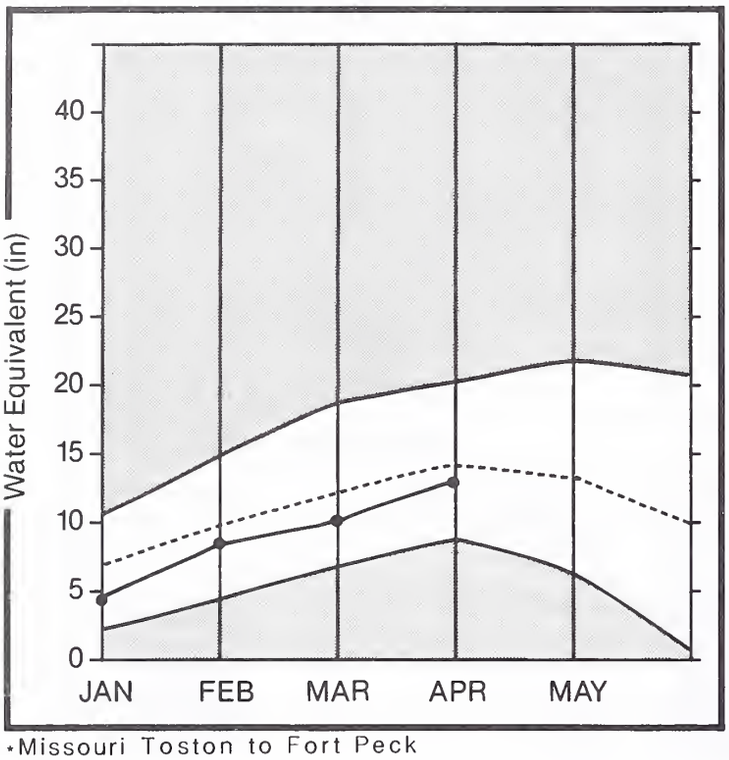
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
UPPER GALLATIN	15	119	90
EAST GALLATIN	13	100	85
GALLATIN	25	114	90

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Missouri Basin

Mountain snowpack* (inches)



*Missouri Toston to Fort Peck

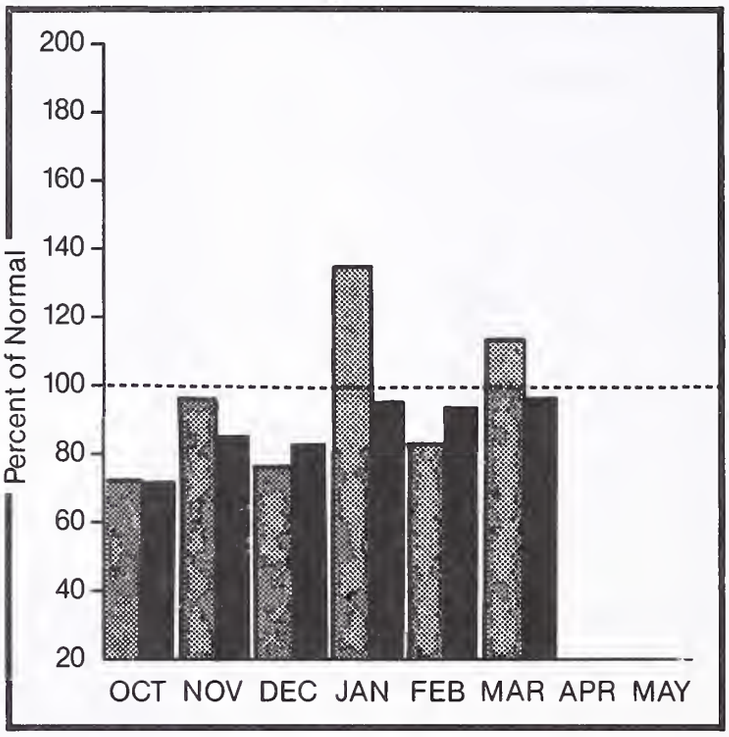
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

March mountain precipitation was above average. Snowpack levels have increased and now are near average except in the Bear Paw Mountains and the Judith and Musselshell Drainages. Streamflow forecasts have increased somewhat from March 1 but are generally for below average flow.

For more information contact your local Soil Conservation Service office.

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
MISSOURI RIVER at Toston 2	APR-JUL	1960	87			2500	1420	2250
	APR-SEP	2270	88			2890	1670	2590
PRICKLY PEAR CREEK nr Clancy	APR-JUL	22	85	37	6.9	31	12.6	26
	APR-SEP	26	84	44	9.3	37	14.8	31
SMITH RIVER nr Ft. Logan	APR-JUL	51	75	82	21	74	28	68
	APR-SEP	61	76	93	29	88	34	80
SHEEP CREEK nr White Sulphur Spgs.	APR-JUL	14.8	79	18.2	11.2	22	7.7	18.8
	APR-SEP	17.1	78	21	13.1	25	8.7	22
BELT CREEK near Monarch	APR-JUL	92	75	128	56	134	50	123
	APR-SEP	100	75	138	65	146	54	134
MISSOURI RIVER at Fort Benton 2	APR-JUL	2810	81			3750	1870	3470
	APR-SEP	3400	85			4480	2280	3990
MISSOURI RIVER at Virgelle 2	APR-JUL	3310	84			4620	2200	3960
	APR-SEP	3900	87			5390	2640	4500
MISSOURI RIVER near Landusky 2	APR-JUL	3660	85			5170	2410	4310
	APR-SEP	4320	88			5990	2850	4900
N.F. MUSSELSHELL near Delpine	APR-JUL	4.5	80	6.4	2.6	6.6	2.4	5.6
	APR-SEP	5.3	84	7.3	3.3	7.7	2.9	6.4
S.F. MUSSELSHELL above Martinsdale	APR-JUL	47	82	72	23	69	25	57
	APR-SEP	49	80	73	25	72	26	61
MISSOURI RIVER below Fort Peck 2	APR-JUL	3680	86			5260	2320	4260
	APR-SEP	4220	88			6040	2730	4800
LAKE SAKAKAWEA Inflow 2	APR-JUL	10100	92			13400	7240	11000
	APR-SEP	11300	93			15100	8130	12200

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
CANYON FERRY LAKE	2043.0	1273.0	1436.0	1502.0
HELENA VALLEY	9.2	3.8	4.4	4.5
LAKE HELENA	10.4	10.9	10.9	10.0
HAUSER & HELENA	61.9	63.1	63.1	60.6
HOLTER LAKE	81.9	78.1	80.5	65.0
SMITH RIVER	10.6	2.8	3.2	7.8
NEWLAN CREEK	12.4	7.2	9.1	8.9
BAIR	7.0	1.2	2.2	4.9
MARTINSDALE	23.1	0.3	3.6	10.2
DEADMAN'S BASIN	72.2	20.1	44.2	52.0
FORT PECK LAKE*	18.9	12.3	14.7	15.1

*Million Acre Feet

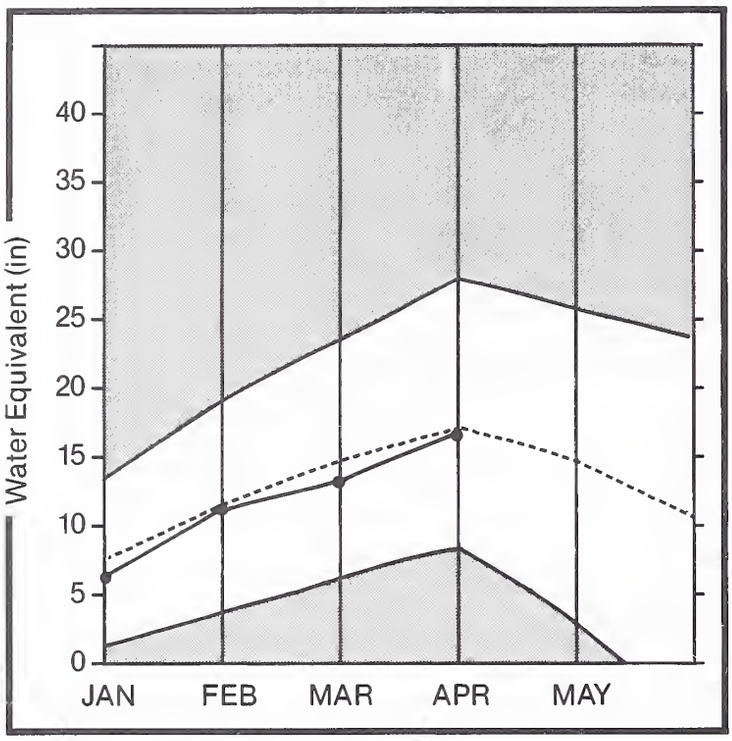
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
MISSOURI HEADWATERS	120	135	101
WEST SIDE MISSOURI	11	127	100
SMITH-BELT	11	118	91
MISSOURI MAINSTEM	22	122	95
SUN-TETON-MARIAS	18	122	96
JUDITH-MUSSELSHELL	20	108	87
MISSOURI above FORT PECK	165	130	99
MILK HEADWATERS	5	139	96
BEAR PAW	7	117	82
MILK RIVER	12	135	93
MISSOURI in MONTANA	174	130	99
MISSOURI blw YELLOWSTONE	280	125	97

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Sun, Teton and Marias Basins

Mountain snowpack* (inches)



*Sun-Teton-Marias

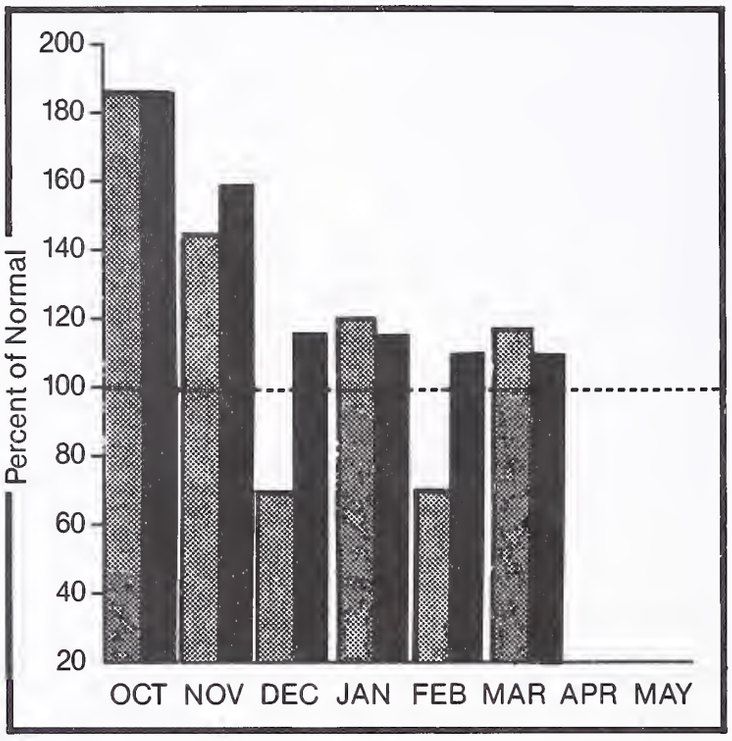
Maximum

Minimum

Average

Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation

Year to date precipitation

Water Supply Outlook

Mountain precipitation was above average for March. Snowpack percentages increased to a little below average throughout the Basin. Spring and summer streamflow forecasts increased slightly over last month and are expected to be 5 to 10 percent below average.

For more information contact your local Soil Conservation Service office.

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
SUN RIVER at Gibson Dam 2	APR-JUL	410	83	520	300	520	300	494
	APR-SEP	450	83	565	335	570	330	542
TWO MEDICINE CREEK near Browning 2	APR-JUL	205	92	270	145	280	130	222
	APR-SEP	215	91	280	154	290	140	235
BADGER CREEK near Browning	APR-JUL	103	96	130	76	139	67	107
	APR-SEP	119	97	149	91	158	80	123
SWIFT RESERVOIR Inflow nr Ouputer	APR-JUL	68	97	86	51	92	44	70
	APR-SEP	79	96	98	63	105	53	82
CUT BANK CREEK at Cut Bank	APR-JUL	84	91	110	57	115	53	92
	APR-SEP	92	92	120	63	124	60	100
MARIAS RIVER near Shelby	APR-JUL	430	90			695	320	478
	APR-SEP	450	90			720	340	501

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
GIBSON	99.1	38.2	57.7	48.9
PISHKUN	32.0	19.9	17.9	18.7
WILLOW CREEK	32.2	24.5	24.4	22.0
LOWER TWO MEDICINE LAKE	11.9	11.9	10.3	9.0
FOUR HORNS LAKE	19.2	14.0	13.7	12.4
SWIFT	30.0	14.7	25.0	16.4
LAKE FRANCES	112.0	45.6	91.7	69.6
LAKE ELWELL (TIBER)	1347.0	700.4	667.9	572.2

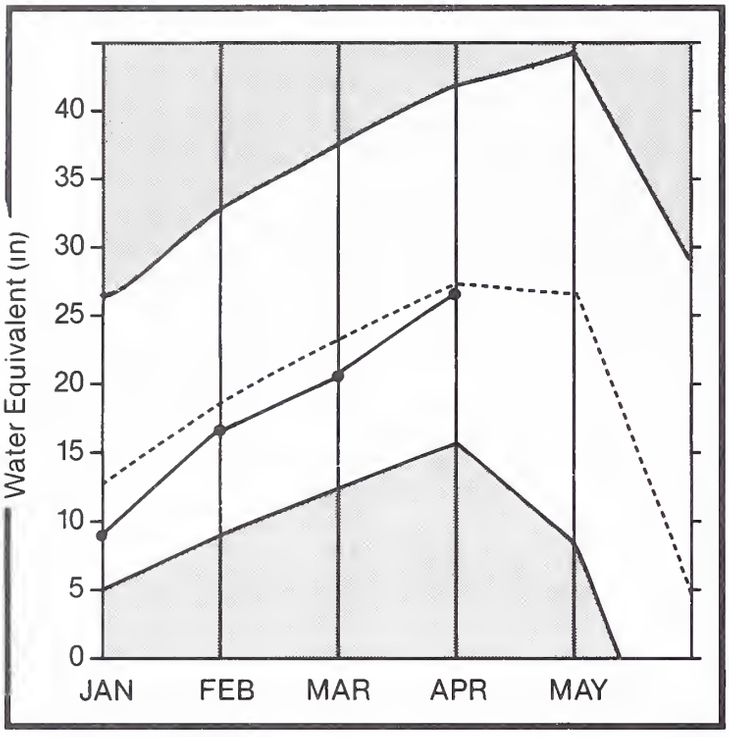
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
SUN-TETON	12	127	98
MARIAS	7	117	94
SUN-TETON-MARIAS	18	122	96

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

St. Mary and Milk Basins

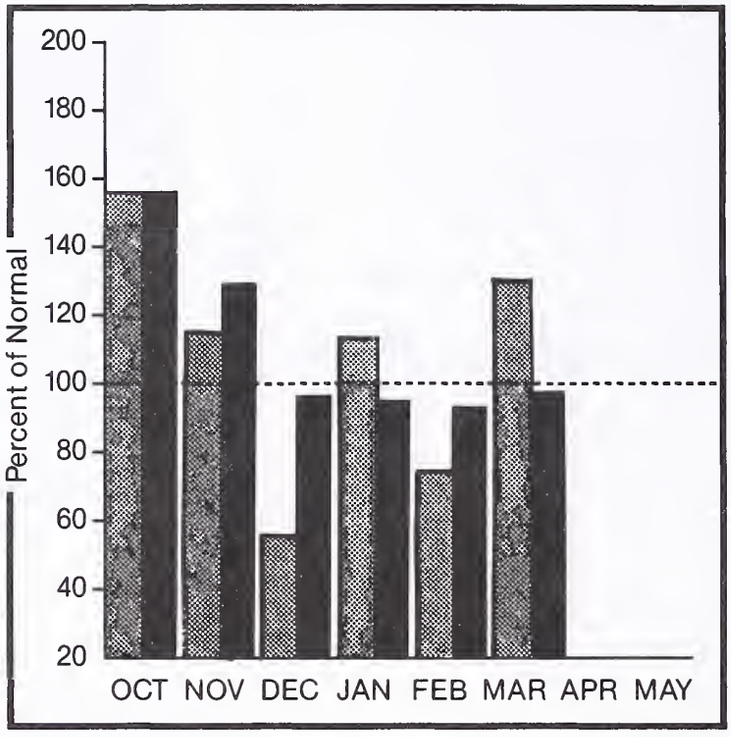
Mountain snowpack* (inches)



*St. Mary

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

March mountain precipitation was 130 percent of average. Snowpack in the Bow and Oldman River Drainages in Alberta, Canada, have increased to about 110 percent of average. Snowpack is now near average in the St. Mary and Milk Headwaters and below average in the Bear Paw Mountains. Runoff forecasts in the St. Mary Drainage have increased slightly but remain about 90 percent of average. The natural flow of the Milk River without the St. Mary Canal is expected to produce only about 60 percent of average runoff.

For more information contact your local Soil Conservation Service office.

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
SWIFTCURRENT CREEK at Sherburne 2	APR-JUL	98	89	109	87	120	76	110
	APR-SEP	116	91	126	104	142	90	128
ST. MARY RIVER near Babb 2	APR-JUL	360	89	415	305	415	305	404
	APR-SEP	420	89	470	370	480	360	474
MILK RIVER at Eastern Crossing	APR-SEP	42	58			65	35	73
MILK RIVER at Eastern Crossing 2	APR-SEP	210	88			220	205	239

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
LAKE SHERBURNE	64.3	22.0	25.6	23.3
FRESNO	127.0	32.2	69.8	77.3
BEAVER CREEK	3.5	1.2	3.0	2.3
NELSON	66.8	8.3	41.4	36.6

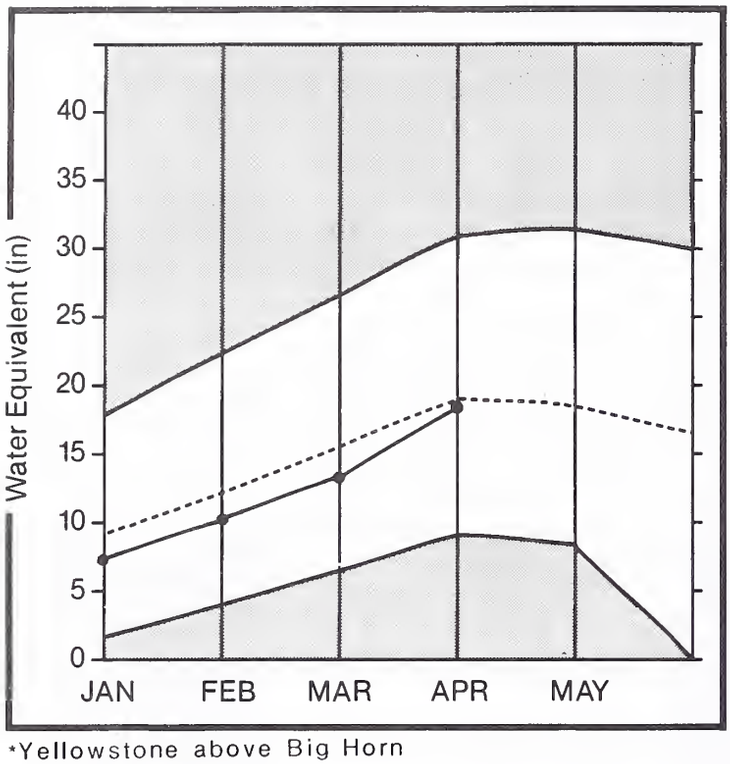
WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
MILK HEADWATERS	5	139	96
BEAR PAW	7	117	82
MILK RIVER	12	135	93
ST. MARY	8	137	97
ST. MARY and MILK	15	134	95
BOW RIVER in ALBERTA	21	121	111
OLDMAN RIVER in ALBERTA	9	131	112

WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Yellowstone Basin

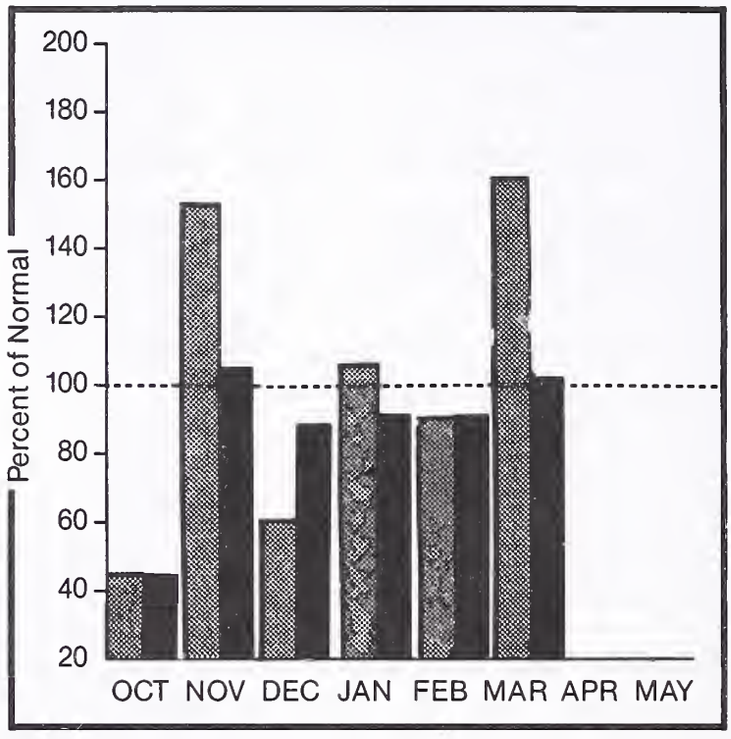
Mountain snowpack* (inches)



*Yellowstone above Big Horn

Maximum
Minimum
Average
Current

Precipitation* (percent of normal)



*Based on selected stations

Monthly precipitation
Year to date precipitation

Water Supply Outlook

Mountain precipitation during March was 167 percent of average. The snowpack varies throughout the Basin with above average snow in the headwaters area of Yellowstone National Park to below average in other areas. The Little Bighorn, Powder, and Tongue River Drainages in Wyoming have below average snowpack. Streamflow forecasts have increased and now indicate near average flows except on the Shields River, the inflow to Cooney Reservoir and from the Wyoming drainages.

For more information contact your local Soil Conservation Service office.

STREAMFLOW FORECASTS

FORECAST POINT	FORECAST PERIOD	MOST PROBABLE (1000AF)	MOST PROBABLE (% AVG.)	WET SUBS. (1000AF)	DRY SUBS. (1000AF)	REAS. MAX. (1000AF)	REAS. MIN. (1000AF)	25 YR. AVG. (1000AF)
YELLOWSTONE at Lake Outlet	APR-JUL	650	110	715	565	725	575	590
	APR-SEP	925	113	1010	810	1030	820	818
YELLOWSTONE at Corwin Springs	APR-JUL	1830	111	2080	1580	2040	1620	1650
	APR-SEP	2200	110	2520	1940	2460	1940	2000
YELLOWSTONE near Livingston	APR-JUL	2060	107	2350	1770	2310	1810	1920
	APR-SEP	2470	106	2820	2140	2770	2170	2330
SHIELDS RIVER near Livingston	APR-JUL	123	82	198	48	165	81	150
	APR-SEP	139	83	220	62	186	92	167
BOULDER RIVER at Big Timber	APR-JUL	320	91	370	280	400	240	353
	APR-SEP	340	89	395	300	425	255	384
WEST ROSEBUD CREEK near Roscoe	APR-JUL	60	94	73	47	75	45	64
	APR-SEP	78	94	90	66	98	58	83
STILLWATER RIVER nr Absarokee 2	APR-JUL	520	99	610	430	675	365	524
	APR-SEP	620	99	720	520	810	435	625
CLARKS FORK RIVER near Belfry	APR-JUL	530	98	635	425	665	395	540
	APR-SEP	600	100	715	485	750	450	603
COONEY RESERVOIR Inflow	APR-JUL	37	76	58	15.4	52	22	49
	APR-SEP	46	77	69	21	64	28	60
YELLOWSTONE RIVER at Billings 2	APR-JUL	3730	100			4370	3130	3740
	APR-SEP	4400	100			5150	3690	4410
YELLOWSTONE RIVER at Miles City 2	APR-JUL	5470	97			6650	4340	5640
	APR-SEP	6360	98			7790	5060	6510
YELLOWSTONE RIVER near Sidney 2	APR-JUL	5980	96			7480	4540	6260
	APR-SEP	6870	95			8600	5210	7200

RESERVOIR STORAGE (1000AF)

RESERVOIR	USEABLE CAPACITY	** USEABLE STORAGE ** THIS YEAR	LAST YEAR	AVG.
MYSTIC LAKE	21.0	1.1	0.3	3.6
COONEY	27.4	21.2	23.7	15.9
BIGHORN LAKE	1356.0	650.6	840.3	670.0
TONGUE RIVER	68.0	39.3	28.4	37.0

WATERSHED SNOWPACK ANALYSIS

WATERSHED	NO. COURSES AVG'D	THIS YEAR AS % OF LAST YR.	AVERAGE
YELLOWSTONE ab LIVINGSTON	27	150	105
SHIELDS	10	124	93
BOULDER-STILLWATER	12	115	92
CLARK'S FORK-ROCK CREEK	21	140	101
YELLOWSTONE above BIGHORN	56	131	97
LITTLE BIGHORN	5	88	80
WIND RIVER (Wyoming)	29	108	97
BIGHORN RIVER (Wyoming)	33	112	91
BIGHORN BASIN (Total)	57	110	93
TONGUE RIVER (Wyoming)	15	82	75
POWDER RIVER (Wyoming)	14	83	72
YELLOWSTONE RIVER	121	116	93

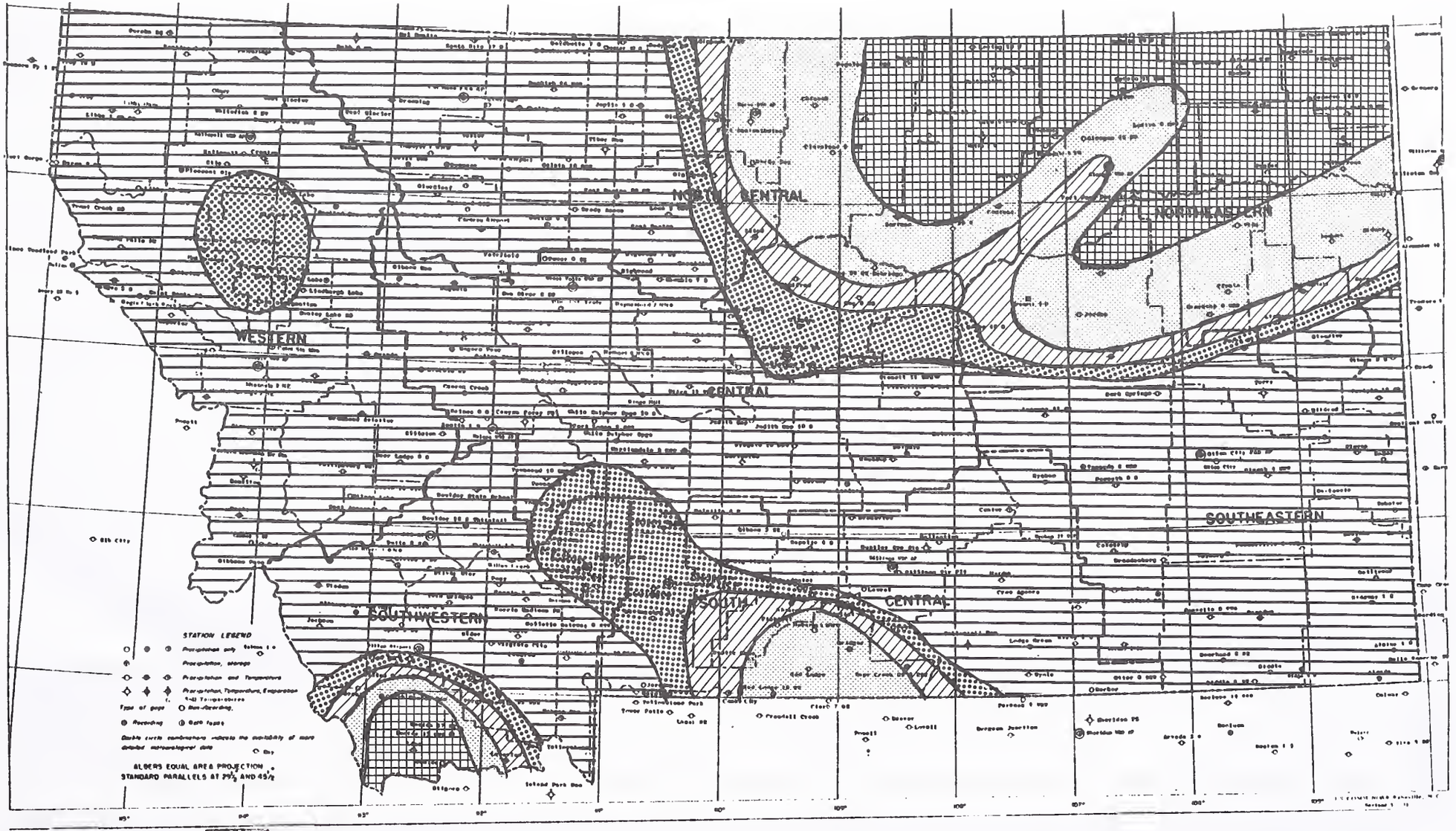
WET SUBS. and DRY SUBS. represent 150 and 50 percent subsequent precipitation events respectively.
REAS. MAX. and REAS. MIN. forecasts are for 10% and 90% exceedance levels with the exception of (1) below.
(1) - REAS. MAX. and REAS. MIN. forecasts are for 5% and 95% exceedance levels.
(2) - Corrected for upstream diversions or changes in reservoir storage.

Snow Data Measurements

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-85
MONTANA						
ABUNDANCE LAKE	8800	3/27/89	63	18.8	15.6	21.5
AMBROSE	6480	4/02/89	50	15.0	12.2	13.6
ARCH FALLS	7350	3/28/89	40	10.8	12.0	13.2
ASHLEY DIVIDE	4820	3/28/89	29	9.2	4.6	7.0
BADGER PASS PILLOW	6900	4/01/89	---	35.1	31.1	36.4
BADGER PASS	6900	4/07/89	98	37.8	34.8	38.8
BALD RIDGE	7500	3/30/89	46	13.9	11.6	13.9
BANFIELD MTN PILLOW	5600	4/01/89	---	18.8	14.3	21.1
BANFIELD MOUNTAIN	5600	3/25/89	56	19.6	15.2	23.7
BAREE CREEK	5500	3/30/89	102	39.7	33.0	47.2
BAREE MIDWAY	4600	3/30/89	87	32.7	28.8	36.6
BAREE TRAIL	3800	3/30/89	29	10.0	4.7	8.7
BARKER LAKES	8250	4/03/89	52	14.2	12.8	15.9
BARKER LAKES PILLOW	8250	4/01/89	---	14.8	12.5	16.3
BASIN CREEK	7180	3/31/89	33	8.8	6.1	9.2
BASIN CREEK PILLOW	7180	4/01/89	---	6.3	6.4	8.9
BASSOO PEAK	5150	3/29/89	36	12.6	7.1	11.9
BEAGLE SPRINGS	8850	3/31/89	38	9.6	8.2	10.2
BEAGLE SPGS PILLOW	8850	4/01/89	---	8.3	7.5	9.4
BEAR BASIN	8150	3/29/89	61	18.7	18.8	21.9
BEAR PAW SKI AREA	5200	3/28/89	20	6.2	6.4	7.4
BEAVER CREEK PILLOW	7850	4/01/89	---	18.3	13.1	19.9
BERRY MEADOW	7000	3/29/89	29	8.4	6.3	8.2
BIG CREEK	6750	3/30/89	111	44.6	33.8	46.6
BIG SKY	7700	3/31/89	59	16.2	15.4	16.8
BIG SKY MEADOW	6350	3/29/89	29	8.6	5.6	9.8
BIG SNOWY	7150	3/29/89	49	14.8	19.4	22.7
BISSON CREEK	4920	3/29/89	41	13.3	--	--
BLACK BEAR	7950	3/30/89	136	52.3	36.0	43.2
BLACK BEAR PILLOW	7950	4/01/89	---	51.2	31.1	39.3
BLACK MOUNTAIN	7750	3/30/89	56	15.4	13.1	17.0
BLACK PINE PILLOW	7100	4/01/89	---	13.1	12.2	15.0
BLACK PINE	7100	3/28/89	39	13.0	10.4	14.0
BLACKTAIL	5650	4/01/89	55	18.2	11.0	--
BLOODY DICK PILLOW	7550	4/01/89	---	12.8	10.1	13.2
BLOODY DICK	7600	3/27/89	41	11.8	10.6	14.2
BLUE LAKE	5900	4/07/89	62	24.9	21.2	25.9
BOTS DOTS	7750	3/28/89	25	6.6	7.4	8.3
BOULDER MOUNTAIN	7950	3/27/89	57	17.6	15.9	20.1
BOULDER MTN PILLOW	7950	4/01/89	---	19.9	17.1	22.1
BOX CANYON	6670	4/02/89	38	12.6	11.0	12.4
BOX CANYON PILLOW	6700	4/01/89	---	7.6	8.7	10.2
BOXELDER CREEK	5100	3/28/89	30	7.9	6.7	8.7
BRANHAM LAKES	8850	3/27/89	84	28.2	24.8	30.9
BRIDGER BOWL PILLOW	7250	3/30/89	---	23.8	19.9	27.5
BRIDGER BOWL	7250	3/30/89	80	26.6	19.6	28.0
BRISTOW CREEK	3900	3/25/89	25	9.0	6.0	9.6
BRUSH CREEK TIMBER	5000	3/30/89	38	10.5	5.7	9.9
BULL MOUNTAIN	6600	3/28/89	21	7.2	4.6	6.5
CABIN CREEK	5200	3/30/89	26	7.9	5.6	6.3
CALL ROAD	8050	3/29/89	50	12.9	10.5	12.8
CALVERT CREEK	6430	3/30/89	39	10.6	8.0	12.0
CALVERT CR PILLOW	6430	4/01/89	---	9.4	7.1	9.1
CAMP MISERY	6400	4/08/89	132	54.9	35.4	50.1
CAMP SENIA	7890	3/28/89	21	4.0	5.6	6.9
CARROT BASIN PILLOW	9000	4/01/89	---	28.8	19.3	29.2
CARROT BASIN	9000	3/31/89	106	35.5	25.2	37.7
CARTER CREEK	7400	4/01/89	25	6.6	4.0	6.0
CASHE CREEK PILLOW	7800	4/01/89	---	11.2	9.2	10.6
CEDAR GROVE	3760	3/25/89	46	15.6	8.7	12.2
CHESSMAN RESERVOIR	6200	3/29/89	24	6.4	4.0	4.0
CHICKEN CREEK	4060	3/28/89	45	17.5	13.8	14.1
CLOVER MDW PILLOW	8800	4/01/89	---	16.1	13.7	18.5
CLOVER MEADOW	8600	3/29/89	56	15.0	12.2	18.9
COLE CREEK	7850	3/30/89	59	14.9	11.0	18.4
COLE CREEK PILLOW	7850	4/01/89	---	13.4	12.2	18.3
COLLEY CREEK	6300	3/31/89	28	7.5	7.4	8.9
COMBINATION	5600	3/28/89	24	7.1	5.1	6.3
COMBINATION PILLOW	5600	4/01/89	---	6.7	5.3	6.5
COOKE STATION	8150	3/30/89	75	25.4	14.6	20.2
COPPER BOTTOM	5200	3/27/89	39	12.4	10.1	10.8
COPPER BOTTOM PILLOW	5200	4/01/89	---	12.7	10.5	13.3
COPPER CAMP PILLOW	6950	4/01/89	---	30.6	26.3	35.9
COPPER CAMP	6950	3/27/89	74	27.4	25.7	31.4
COPPER CREEK	5700	3/27/89	41	14.1	12.5	14.9
COPPER MOUNTAIN	7700	3/27/89	40	10.6	8.4	12.1
COTTONWOOD CREEK	6400	3/30/89	37	9.2	6.8	9.3
COYOTE HILL	4200	3/29/89	37	12.0	9.5	9.8
CREVICE MOUNTAIN	8400	3/31/89	46	11.7	7.7	11.1
CRYSTAL LAKE	6050	3/29/89	35	10.9	14.6	14.8
CRYSTAL LAKE PILLOW	6050	4/01/89	---	10.0	14.7	15.5
DAD CREEK LAKE	8400	3/30/89	55	13.6	13.0	15.1
DAISY PEAK	7600	3/29/89	37	10.2	7.7	11.7
DALY CREEK	5780	3/29/89	40	12.3	11.4	12.4
DALY CREEK PILLOW	5780	4/01/89	---	11.4	10.3	12.6
DARKHORSE LK. PILLOW	8700	4/01/89	---	24.3	19.4	25.1
DARKHORSE LAKE	8600	3/27/89	76	24.8	21.0	28.1
DAVIS CREEK	5400	3/25/89	63	23.4	19.8	24.3
DEADMAN CR PILLOW	6450	4/01/89	---	10.5	9.6	10.8
DEADMAN CREEK	6450	3/28/89	35	10.6	9.2	11.8
DESERT MOUNTAIN	5600	3/27/89	44	14.1	11.9	16.2
DEVILS SLIDE	8100	3/28/89	58	16.6	18.9	23.0
DISCOVERY BASIN	7050	3/30/89	41	11.2	8.8	11.8
DIVIDE	7800	3/31/89	51	13.2	7.4	12.0
DIVIDE PILLOW	7800	4/01/89	---	12.3	8.0	12.5
DIX HILL	6400	4/02/89	38	12.9	9.1	11.5
DUPUYER CREEK	5750	3/28/89	48	16.7	--	--
DUPUYER CREEK PILLOW	5750	4/01/89	---	14.1	10.6	13.6
EAGLE CREEK	7000	3/23/89	49	14.1	11.7	14.9
EAST BOULDER S	9250	3/30/89	95	30.4	24.5	31.6
EAST FORK R.S.	5400	3/29/89	22	6.6	6.2	5.8
EL DORADO MINE	7800	3/29/89	67	21.0	15.6	22.3
ELK HORN SPRINGS	7800	3/27/89	38	9.6	7.0	9.6
ELK PEAK	8000	4/03/89	54	15.8	12.7	17.8
EMERY CREEK	4350	3/27/89	44	16.1	13.1	15.9
EMERY CREEK PILLOW	4350	4/01/89	---	16.0	13.0	16.7
FATTY CREEK	5500	3/30/89	74	26.5	20.9	24.8
FISH CREEK	8000	3/31/89	36	8.9	7.0	10.4
FISHER CREEK PILLOW	9100	4/01/89	---	39.5	27.1	37.0
FISHER CREEK	9100	3/30/89	126	44.1	28.0	39.6
FLATTOP MTN PILLOW	6300	4/01/89	---	43.4	35.2	46.8
FLEECER RIDGE	7500	3/28/89	42	12.0	8.8	11.7
FOOLHEN	8280	3/27/89	54	15.0	13.3	17.8
FOREST LAKE	6400	3/23/89	43	11.6	10.2	13.0
FOUR MILE	6900	3/29/89	32	9.0	7.2	9.2
FOURTH OF JULY	3450	3/29/89	24	8.8	5.6	7.3
FRED BURR PASS	8000	3/31/89	74	22.2	18.3	26.2
FRIDAY HILL	4620	3/29/89	64	20.8	11.6	20.4
FROHNER MEADOWS	6480	3/29/89	31	8.4	6.7	8.5
FROHNER MDWS PILLOW	6480	4/01/89	---	9.4	6.3	10.5
GARVER CREEK PILLOW	4250	3/25/89	---	9.4	8.3	10.0
GARVER CREEK	4250	3/25/89	34	9.8	7.8	10.5
GIBBONS PASS	7100	3/28/89	67	23.5	18.8	24.0
GOAT MOUNTAIN	7000	3/31/89	37	10.9	7.9	10.8
GOLD CREEK LAKE	7200	3/29/89	48	15.2	13.2	16.5
GOLD STONE	8100	3/27/89	54	15.4	12.4	18.0
GRASSHOPPER	7000	4/03/89	28	7.8	4.2	6.3
GRAVE CRK PILLOW	4300	4/01/89	---	18.8	12.7	17.1
GRAVE CREEK	4300	3/25/89	53	18.8	12.1	17.6
GRIFFIN CR DIVIDE	5150	3/28/89	38	12.7	8.4	11.7
GUNSIGHT LAKE	6300	4/07/89	108	44.5	38.0	40.2
HANO CREEK	5030	3/30/89	46	14.4	8.8	14.5
HAND CREEK PILLOW	5030	4/01/89	---	11.8	8.1	14.2
HAWKINS LAKE PILLOW	6450	4/01/89	---	25.9	22.7	28.1
HAWKINS LAKE	6450	3/25/89	75	28.2	25.9	30.8
HAYMAKER	8050	3/31/89	40	9.1	8.0	13.2
HEART LAKE TRAIL	4800	3/28/89	65	23.3	19.3	22.0
HEBGEN DAM	6550	3/31/89	47	15.1	6.8	12.5
HELL ROARING DIVIDE	5770	3/29/89	90	24.4	24.8	32.1
HERRIG JUNCTION	4850	3/28/89	73	26.9	20.8	28.1
HOLBROOK	4530	3/28/89	23	7.8	5.6	9.4
HOOD MEADOW	6600	3/28/89	30	8.6	11.9	11.5
HOODOO BASIN PILLOW	6050	4/01/89	---	43.1	37.6	48.9
HOODOO BASIN	6050	3/28/89	133	49.4	43.5	51.8
HOODOO CREEK	5900	3/28/89	120	42.2	37.8	47.8
INDEPENDENCE	7850	4/02/89	60	19.2	14.4	18.7
INTERGAARD	6450	3/28/89	31	8.3	7.0	9.0
JAHNKE LAKE TRAIL	7200	3/27/89	35	9.8	7.8	10.4
JOHNSON PARK	6450	3/29/89	25	8.0	5.2	7.2
KEELER CREEK	3300	3/26/89	40	14.6	9.8	10.8
KINGS HILL	7500	3/27/89	43	13.0	11.7	14.9
KISHENEHN	3890	4/02/89	26	8.2	4.6	7.3
KIWANIS CAMP	3720	3/28/89	0	.0	.2	.9
KRAFT CREEK	4750	3/30/89	47	19.6	--	--
KRAFT CREEK PILLOW	4750	4/01/89	---	20.2	11.5	11.2
LAKE CREEK	6100	3/29/89	31	8.9	4.5	9.0
LAKEVIEW CANYON	6930	3/27/89	36	10.6	5.3	13.1

SNOW COURSE	ELEVATION	OATE	SNOW OEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-85
LAKEVIEW ROG. PILLOW	7400	4/01/89	---	13.2	7.3	14.7
LAKEVIEW RIOGE	7400	3/27/89	35	9.8	5.8	11.7
LEMHI PASS	7480	3/27/89	29	8.2	7.2	9.4
LEMHI RIOGE	8100	3/27/89	38	10.0	10.1	10.8
LEMHI RIOGE PILLOW	8100	4/01/89	---	10.8	10.4	11.6
LICK CREEK PILLOW	6860	4/01/89	---	12.6	12.2	10.8
LICK CREEK	6860	3/28/89	34	9.3	13.3	10.8
LITTLE PARK	7400	3/29/89	48	14.9	13.2	16.9
LOGAN CREEK	4300	3/29/89	31	8.4	5.2	7.3
LONE MOUNTAIN	8880	3/31/89	77	22.7	21.9	23.8
LOST HORSE	5940	3/29/89	87	31.8	28.2	33.4
LOST SOUL	4800	3/25/89	43	14.5	10.2	15.7
LOWER TWIN PILLOW	7900	4/01/89	---	19.0	14.5	20.1
LOWER TWIN	7900	3/29/89	68	22.0	18.2	22.4
LU8RECHT FLUME	4680	3/31/89	22	7.2	.5	4.6
LU8RECHT PILLOW	4680	4/01/89	---	7.8	1.8	5.1
LU8RECHT FOREST NO 3	5450	3/30/89	30	9.4	4.6	7.1
LU8RECHT FOREST NO 4	4650	3/30/89	12	3.8	.9	2.3
LU8RECHT FOREST NO 6	4040	3/30/89	14	4.7	1.3	2.5
LU8RECHT HYOROPLOT	4200	3/31/89	20	7.0	.0	4.5
MAOISON PLT PILLOW	7750	4/01/89	---	34.2	20.8	25.3
MAOISON PLATEAU	7750	3/30/89	86	30.8	21.6	24.1
MANY GLACIER	4900	3/31/89	56	19.8	14.0	20.9
MANY GLACIER PILLOW	4900	4/01/89	---	22.4	11.3	18.5
MARIAS PASS	5250	3/31/89	47	16.2	10.9	18.1
MAYNARO CREEK	6210	3/30/89	49	14.8	11.5	16.1
MAYNARO CR PILLOW	6210	3/30/89	---	12.6	9.8	12.2
MIOOLE MILL CREEK	7850	3/29/89	54	15.8	14.8	17.5
MILL CREEK	7500	3/31/89	39	11.2	11.2	13.8
MINERAL CREEK	4000	3/31/89	52	19.6	13.6	18.0
MONUMENT PK PILLOW	8850	4/01/89	---	19.7	14.9	21.8
MONUMENT PEAK	8850	4/02/89	85	26.4	19.8	27.2
MOSS PEAK	6780	3/30/89	106	41.0	31.0	--
MOSS PEAK PILLOW	6780	4/01/89	---	37.0	27.4	42.8
MOULTON RESERVOIR	6850	4/04/89	33	8.8	6.0	7.0
MT LOCKHART PILLOW	6400	4/01/89	---	20.5	19.2	21.8
MOUNT LOCKHART	6400	4/03/89	65	22.8	21.0	23.4
MUOO LAKE	7650	3/30/89	59	18.6	15.9	21.1
MULE CREEK	8300	3/31/89	56	15.8	13.3	16.2
MULE CREEK PILLOW	8300	4/01/89	---	15.8	14.2	14.2
NEVAOA CREEK	6480	3/27/89	50	16.2	12.3	15.2
NEVAOA CREEK PILLOW	6480	4/01/89	---	16.5	11.9	14.2
NEW WORLO	6900	3/29/89	42	12.4	17.0	16.1
NEWTON MOUNTAIN	5600	3/30/89	100	33.2	24.8	36.1
NEZ PERCE CMP PILLOW	5650	4/01/89	---	16.0	14.7	15.6
NEZ PERCE CAMP	5650	3/29/89	47	15.6	14.8	15.5
NEZ PERCE CREEK	6600	3/27/89	24	5.9	5.8	7.3
NEZ PERCE PASS	6570	3/29/89	49	15.8	15.6	17.8
NOISY 8ASIN	6040	4/09/89	125	50.7	31.6	46.7
NOISY 8ASIN PILLOW	6040	4/01/89	---	43.3	29.4	41.6
N.F. ELK CR PILLOW	6250	4/01/89	---	13.9	10.0	14.1
N.F. ELK CREEK	6250	3/31/89	45	13.5	9.5	12.9
NORTH FORK JOCKO	6330	3/30/89	122	48.6	37.4	46.2
NORTH MEAOOW	7500	3/29/89	33	8.2	6.7	9.3
N.E. ENTRANCE PILLOW	7350	4/01/89	---	10.1	6.8	9.5
NORTHEAST ENTRANCE	7350	4/01/89	35	9.9	5.4	9.5
NOTCH	8500	3/29/89	49	13.0	9.6	17.3
OPHIR PARK	7150	4/02/89	58	19.1	14.8	18.5
PAL1SADE CREEK	8250	3/30/89	85	29.4	23.9	30.5
PETERSON MOW PILLOW	7200	3/28/89	---	10.3	8.4	11.2
PETERSON MEAOOWS	7200	3/28/89	39	10.5	8.1	11.1
PICKET PIN O	9450	3/30/89	69	20.7	20.5	26.3
PICKET PIN LOWER	6200	3/29/89	12	3.2	3.4	2.8
PICKET PIN MIOOLE	7250	3/29/89	30	9.2	10.0	13.8
PICKET PIN UPPER	8100	3/29/89	60	17.0	16.7	21.0
PICKFOOT CREEK	6650	3/27/89	33	10.5	8.3	11.1
PICKFOOT CRK PILLOW	6650	4/01/89	---	10.7	9.2	12.0
PIKE CREEK	5930	3/28/89	68	23.2	19.0	25.1
PIKE CREEK PILLOW	5930	4/01/89	---	26.0	22.0	29.0
PIPESTONE PASS	7200	3/27/89	20	5.2	4.4	6.1
PLACER 8ASIN F	8830	3/30/89	65	20.8	18.5	22.1
PLACER 8ASIN PILLOW	8830	4/01/89	---	19.0	16.3	16.5
POORMAN CREEK	5100	3/24/89	82	31.8	23.1	36.0
PORCUPINE PILLOW	6500	4/01/89	---	6.5	6.2	8.2
PORCUPINE	6500	3/30/89	32	9.4	6.2	8.4
POTOMAGETON PARK	7150	4/03/89	51	16.7	7.6	15.1
REO MOUNTAIN	6000	3/31/89	70	22.1	12.4	19.3
REO TOP	5260	3/29/89	85	28.0	20.1	29.9
REVAIS CREEK	4800	3/30/89	14	4.8	--	--
ROCK CREEK	5600	3/29/89	32	10.2	12.8	10.7
ROCK CREEK MEADOW	8160	3/31/89	69	19.8	14.9	23.7
ROCKER PEAK	8000	3/29/89	47	14.0	13.3	15.9
ROCKER PEAK PILLOW	8000	4/01/89	---	12.5	11.9	15.7
ROCKY 80Y	4700	3/28/89	10	2.9	3.2	4.8
ROCKY 80Y PILLOW	4700	3/28/89	---	5.5	4.8	5.9
SACAJAWEA	6550	3/30/89	45	14.0	10.6	15.4
SADDLE MTN PILLOW	7900	4/01/89	---	25.0	21.0	27.3
SAODLE MOUNTAIN	7940	3/28/89	75	26.2	21.1	26.2
SENTINEL CREEK	8300	4/03/89	80	26.4	17.6	24.7
SHOWER FALLS	8100	3/28/89	57	16.6	20.4	24.6
SHOWER FALLS PILLOW	8100	4/01/89	---	19.2	20.8	25.0
SILVER RUN	6630	3/30/89	18	3.6	4.6	6.1
SILVER RUN PILLOW	6630	4/01/89	---	5.4	6.0	7.3
SKALKAHO PILLOW	7260	4/01/89	---	24.0	20.6	25.8
SKALKAHO SUMMIT	7250	3/29/89	72	23.6	21.5	26.7
SKYLARK TRAIL	6200	3/30/89	93	39.8	--	--
SKYLARK TRAIL PILLOW	6200	4/01/89	---	39.7	35.0	34.5
SLAG-A-MELT LAKE	8750	3/27/89	76	24.4	18.6	27.0
SLIOE ROCK MOUNTAIN	7100	3/28/89	52	16.0	13.5	17.3
SMUGGLER MINE	6960	3/27/89	40	10.8	8.6	10.8
S.F. SHIELOS PILLOW	8100	4/01/89	---	17.2	14.5	18.5
S.F. SHIELOS	8100	3/30/89	72	23.8	21.2	25.9
SPOTTEO 8EAR MTN.	7000	4/07/89	44	18.1	12.0	15.4
SPUR PARK PILLOW	8100	4/01/89	---	20.7	17.7	22.8
SPUR PARK	8100	3/28/89	60	19.2	16.7	22.2
SQUAW PEAK	6150	3/30/89	58	17.7	--	--
STAHL PEAK	6030	3/25/89	111	41.4	30.9	40.4
STAHL PEAK PILLOW	6030	4/01/89	---	39.3	27.1	38.2
STAR LAKE E	9650	3/30/89	130	44.2	30.5	44.2
STEMPLE PASS	6600	3/30/89	45	12.4	7.8	10.9
STORM LAKE	7780	3/28/89	49	13.9	11.0	14.4
STRYKER 8ASIN	6180	3/28/89	90	33.2	23.4	35.4
STUART MILL	6500	3/28/89	27	7.7	6.6	7.1
STUART MOUNTAIN	7400	3/30/89	92	35.3	26.0	33.8
SUCKER CREEK	3960	3/28/89	0	.0	.0	.3
TAYLOR ROAO	4080	3/28/89	8	2.7	.2	2.6
TEN MILE LOWER	6600	3/28/89	32	8.7	6.5	8.0
TEN MILE MIOOLE	6800	3/28/89	43	11.0	10.0	12.5
TEN MILE UPPER	8000	3/28/89	50	14.2	11.2	14.6
TEPEE CREEK PILLOW	8000	4/01/89	---	15.0	9.9	14.7
TEPEE CREEK	8000	3/29/89	60	17.2	9.4	16.3
TIMBERLINE CREEK	8850	3/28/89	44	11.8	12.2	15.2
TRAIL CREEK	7090	3/27/89	30	7.8	7.5	9.0
TRINKUS LAKE	6100	4/07/89	111	47.6	36.0	44.7
TRUMAN CREEK	4060	4/03/89	23	7.0	1.2	3.4
TV MOUNTAIN	6800	3/30/89	60	21.0	16.2	19.9
TWELVEMILE PILLOW	5600	4/01/89	---	19.5	15.9	19.5
TWELVEMILE CREEK	5600	3/29/89	61	21.8	21.3	22.3
TWENTY-ONE MILE	7150	3/31/89	60	19.5	11.7	18.2
TWIN CREEKS	3580	4/07/89	32	13.4	8.7	10.7
TWIN LAKES PILLOW	6400	4/01/89	---	40.3	36.0	42.5
TWIN LAKES	6510	3/29/89	108	41.3	36.7	42.8
UPPER HOLLANO LAKE	6200	4/07/89	103	42.0	32.6	36.1
WALORON PILLOW	5600	4/01/89	---	12.5	10.9	10.1
WALORON	5600	4/02/89	33	10.2	6.4	10.5
WARM SPRINGS	7800	3/31/89	62	19.2	14.9	20.7
WARM SPRINGS PILLOW	7800	4/01/89	---	19.2	16.7	27.9
WEASEL OIVIOE	5450	3/25/89	94	33.7	24.9	34.7
WEST YELLOWSTONE	6700	3/31/89	41	14.2	7.3	12.1
WHISKEY CREEK PILLOW	6800	4/01/89	---	21.7	12.8	18.1
WHISKEY CREEK	6800	4/01/89	76	28.3	17.0	21.8
WHITE MILL PILLOW	8700	4/01/89	---	27.3	16.9	26.6
WHITE MILL	8700	3/30/89	104	33.6	20.8	28.6
WHITE PINE RIOGE	8850	3/30/89	23	5.6	3.9	5.8
WILLOW CREEK	6500	3/30/89	29	6.4	6.9	9.8
WOOO CREEK PILLOW	5960	4/01/89	---	10.2	7.5	12.2
WRONG CREEK	5700	3/29/89	44	11.1	9.4	14.2
WRONG RIOGE	6800	3/29/89	55	19.1	13.4	19.8

Valley Precipitation



Over 130%

110 - 130%

90 - 110%

70 - 90%

Under 70%

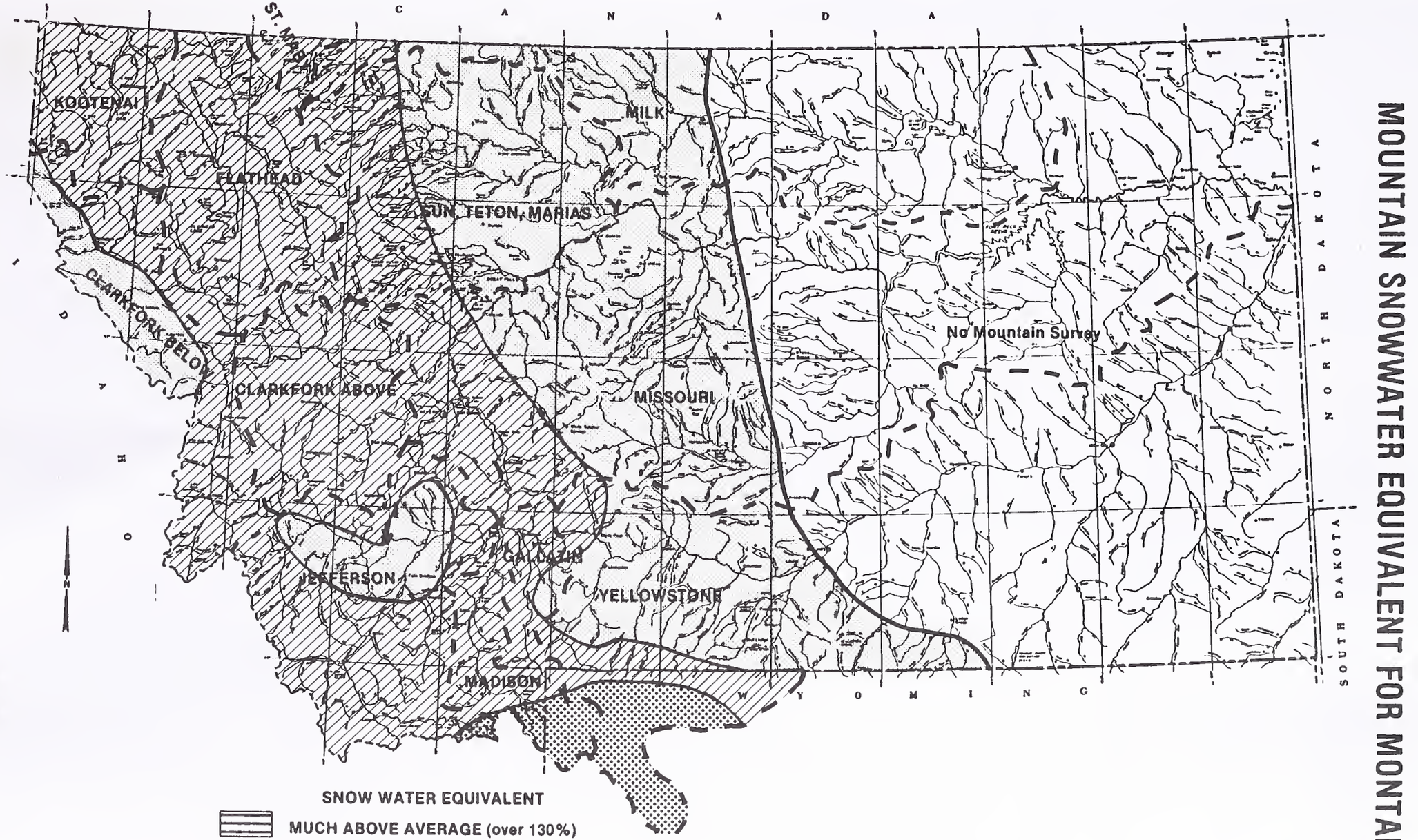
Source: NWS
Great Falls, MT

MARCH 1989

U.S DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

MOUNTAIN SNOWWATER EQUIVALENT FOR MONTANA



SNOW WATER EQUIVALENT

- MUCH ABOVE AVERAGE (over 130%)
- ABOVE AVERAGE (110-130%)
- NEAR AVERAGE (90-110%)
- BELOW AVERAGE (70-90%)
- MUCH BELOW AVERAGE (below 70%)
- NO MOUNTAIN SURVEY

%1961-85 AVERAGE

APRIL 1,1989

0 25 50 75 100 MI

0 50 100 150 KM

SOURCE: Information provided by SCS Snow Survey Personnel

JUNE 1985 4-R-39296-1

The Following Organizations Cooperate With The Soil Conservation Service In Snow Survey Work

Canadian

Department of the Environment
- Atmospheric Environment Service
- Water Management Service

British Columbia Ministry of Environment
- Inventory and Engineering Branch, Hydrology Section

Alberta Environment
- Technical Services Division

Federal

U.S. Department of Agriculture
- Forest Service

U.S. Department of the Army
- Corps of Engineers

U.S. Department of Commerce
- NOAA, National Weather Service
- National Environmental Satellite Service

U.S. Department of the Interior
- Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Reclamation

U.S. Department of Energy
- Bonneville Power Administration

State

Montana Conservation Districts
Montana Department of Fish, Wildlife, and Parks
Montana Department of Natural Resources and Conservation
Montana Department of State Lands
Montana State University - Agricultural Experiment Station
University of Montana - School of Forestry

Private

Big Sky of Montana
Butte Water Company
Confererated Salish & Kootenai Tribes
Flathead Valley Comminity College
Montana Power Company
Pondera County Canal & Reservoir Company

Other organizations and individuals furnish information for the snow survey reports.
Their cooperation is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SNOW SURVEY UNIT
Federal Bldg., Rm. 443
10 East Babcock Street
Bozeman, MT 59715

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

THIRD-CLASS BULK RATE
POSTAGE AND FEES PAID
USDA - SCS

PERMIT NO G-267

THIRD CLASS MAIL

Montana
Water Supply Outlook

and

Federal-State-Private
Cooperative Snow Surveys

SOIL CONSERVATION SERVICE